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FOOD MANUFACTURE

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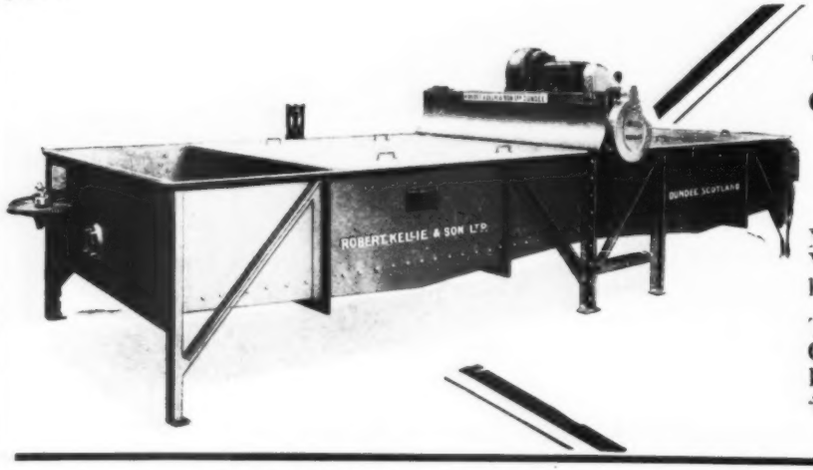

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FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

Volume . . . IX
Number . . . 3

MARCH . . 1934

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FOOD MANUFACTURE

Vol. IX., No. 3 March, 1934

The Tree of Heaven

THAT CELESTIAL tree—the ailanthus (*A glandulosa*)—has been causing a lot of trouble. In May of last year we referred to the adulteration of dried mint by the leaves of the ailanthus. Since then there has been a veritable epidemic of the fraud, a series of prosecutions, and even a full-page note in the *Analyst* giving drawings of the microscopic structure of the leaves.

The Tree of Heaven owes its culinary properties to an essential oil, and is one of the oldest herbs used for cooking purposes. It is supposed to be one of the bitter herbs with which the Israelites were instructed by Moses to dress the lamb of the Passover; that would appear to qualify it as an ingredient for mint sauce!

Justice was Mint!

Although it has such an excellent pedigree and distinguished past, it is not mint as we know mint, and to sell it as our dried domestic product is undoubtedly a fraud. In spite of this, the continued string of prosecutions is rather unfair when all the facts of the case are taken into consideration. The adulterated mint was imported from France into this country by a firm with an unblemished record of 120 years, and they had it sent out to their customers, when required, as received. All the proceedings have been taken in respect of one consignment, and, in spite of the fact that on being made aware of the adulteration the firm had made every effort to call back the packages, the prosecution has descended into a persecution, and some remedy should be sought. The magistrate, in one case, said that it seemed hard to him that there should be so many prosecutions for what could be said to be one offence and promptly imposed a fine of £20 and costs. Such is justice!

Fish Oil Recovery

What is described as the first plant in America to employ a continuous method of fish oil recovery and purification, incorporating centrifugal machines, has been erected at Pittsburg, California.

Briefly the flow sheet is as follows. The fish are conveyed by a screw conveyer to the cookers and thence to the press. The press liquor flows to a "foots recovery unit" (rotary screen) and into a small surge tank equipped with a steam coil. From there it flows in a continuous stream to a slime separator or "primary centrifuge," which gives separate discharges of slime, water, and oil carrying a small proportion of water. This oil then passes through another centrifuge, the "oil purifier," thereby being completely freed from water.

A number of advantages are claimed for this system.

Cheddar Cheese

Writing from the Dairy Research Institute, of New Zealand, McDowall and Dolby point out that the determination of lactic acid in the wheys at various stages in the Cheddar cheese-making process have shown that there is a steady, continuous rise in the percentage present, even through the salting stage. The rise in lactic acid content is accompanied by a marked rise in calcium content, and the lactic acid is carried out into the whey as calcium lactate. There is a sharp fall in the percentage of lactose in the water of the whey liberated by the addition of salt at the salting stage. Work is proceeding on these matters at the Institute.

Butter Fungi

Fungi are largely responsible for the taints and other faults of butter. Recently, samples of butter from all the creameries in Manitoba were examined for fungi, and this work has led to the compilation of a comprehensive list of butter fungi by Bisby, Jamieson, and Timonin, in the August, 1933 issue of the *Canadian Journal of Research*.

Canning Tuna

D. H. Fry, Jr., of the California State Fisheries Laboratory, has carried out tests to learn how much weight tunas lose at different stages of the canning process.

When tunas are taken to a cannery, they are first weighed, then given to cleaners who remove the entrails. This results in a loss of weight of about 7 to 7·5 per cent. The next process is to steam-cook the fish for a time which varies with species, size, fatness, etc. Then they are allowed to cool, sometimes to stand for another day. The cooking and standing for 10 hours result in a further loss of about 27 to 29 per cent. After this, the head, skin, dark meat, fins, and bones are removed, leaving only the white meat, which is then sliced and placed in cans with a little oil and salt.

Hydrogen Penetrates Steel

In the course of their researches at the Low Temperature Station, Cambridge, on the relative rates of corrosion by dilute solutions of citric acid of different samples of mild steel sheets such as are used in the manufacture of tinplate, T. N. Morris and J. M. Bryan came upon a very interesting phenomenon, possibly observed for the first time.

Certain measurements carried out in the course of these experiments indicate that hydrogen was either absorbed by the metal in considerable quantities or else passed through it, and was evolved freely on the other side. That the latter was more probable is supported by the appearance of blisters on the outer side of some of the specimens, showing that the gas passed, at any rate, nearly through the metal, and could exert considerable pressure inside it.

Pearl Barley Smut

Writing in the *Analyst*, P. H. Jones reports that he has examined samples of pearl barley, including some imported from abroad, and he noticed that a few of the latter contained dark-coloured grains, suggesting that the original barley had been affected by smut. Detailed examination of one sample led him to form the opinion that the pearl barley had been prepared from damaged barley, which had been affected by smut and ergot. This opinion was disputed by the exporters. However, a sample was submitted to Professor McLean Thompson, of Liverpool, and he confirmed the presence of ergot, which he said was not the usual one found in rye, but was one that affected barley, and that the smut was *Ustilago hordei*.

Dried Milk

In a report by the Public Analyst to the Government of Burma, it is stated that there is a dried milk powder being marketed successfully in Burma which has a milk-fat content of 29 per cent. This does not bear out a view commonly held that the marketing of a full-cream dried milk in hot climates presents great difficulties owing to its poor keeping properties.

Butter Variations

Booth, Kon, Dann, and Moore are engaged in an investigation of the seasonal variations in butter fat, and have published the first of a series of papers on the subject in the *Biochemical Journal* (vol. 27, p. 1189). This section of their work deals with the interesting problem of seasonal variations in carotin and vitamin A. These were investigated by colorimetric methods. Determinations of the intensity of yellow colour were carried out on the untreated butter fats, and antimony trichloride blue values were determined both on the untreated fats and on the corresponding non-saponifiable residues. The results on the yellow colour and blue value, as determined on the non-saponifiable residues, agreed well with the established variation of the carotin and vitamin A contents of the butter, and corresponded with the quantity of grass or of green fodder available in the diet of the cow. The blue values determined on the untreated butter fat were found to be useless as a guide to vitamin A content, being five to ten times lower than values determined on the non-saponifiable matter.

The authors have worked out a formula for calculating the total vitamin A activity. Their main conclusion so far is that the total vitamin A activity of summer butter fat from shorthorn cows appears to be some three times greater than that of winter butter fat. The fraction of the total activity due to carotin is also greater in summer butter fat.

Oranges and Lemons

Two papers dealing with the properties of citrus fruits have recently appeared. The question of vitamin C in citrus juices has been examined by Bennett and Tarberk (*Biochem. J.*, 1933, vol. 27, p. 1294). Following the work of Svirbely and Szent-Györgyi, which brought considerable evidence that vitamin C is very closely related to the ascorbic acid which can be prepared from orange juice, paprika, or suprarenal glands, Bennett and Tarberk have investigated the relationship between the amount of ascorbic acid determined by titration with dichlorphenol indo phenol and the antiscorbutic action of the material examined.

They found that the reducing power of fresh lemon juice is subject to considerable variation, some having only two-thirds the power of others. It was also established that the reducing power of orange juice is more constant and rather higher than that of lemon juice.

Action of Preservatives

The reducing power of both orange and lemon juice does not diminish in storage in the absence of preservatives, but if any preservative is used which prevents fermentation the reducing power diminishes and disappears in a few weeks. Strong acidification, pasteurisation, or boiling bring about the same result. Their main conclusion is that in untreated juice the reducing factor is protected from atmospheric oxidation by the action of an enzyme, and that when this action is inhibited the reducing power is rapidly lost.

The other paper, by Johnson (*Biochem. J.*, vol. 27, p. 1287) deals with the same subject. He finds that lemon juice oxidised with indophenol, iodine, or hydrogen peroxide can regain its reducing capacity when treated with hydrogen sulphide immediately after oxidation. Both papers are interesting and suggestive.

Rancidity

We have frequently discussed the problems of rancidity, and to keep our readers abreast of the most recent work on the subject reference should be made to two recent papers. The first, by Giles (*J. Soc. Chem. Ind.*, 1933, vol. 52, p. 816), deals with the Taffel and Revis method for estimating the rancidity of oils and fats. It is shown that in the case of fats that have become rancid at moderate temperatures, where one is dealing with fats of very slight rancidity, the variability of the blank limits the application of the test and a modification has been adopted. This is described fully in the paper.

In the second paper, Pritzker and Jungkunz (*Chem. Ztg.*, 1933, vol. 57, p. 895) deal with Taüfel and Thaler's reaction for ketone rancidity. They found that fresh table butter often gives the Taüfel and Thaler reaction for ketone rancidity, and that it is shown by acetyl methyl carbinol, but not by diacetyl. The method has been modified and full working details are to be found in the paper referred to, an abstract of which appeared in the January, 1934, issue of the *Analyst*, on page 48.

Californian Honey

Many North American, particularly Californian, honeys have abnormally low diastatic activities, although no evidence is available that such honeys have been heated or the bees sugar fed. Bartels and Fauth (*Z. Unters. Lebensm.*, vol. 66, p. 396) have just completed an extensive investigation into the matter, but their results fail to reveal any relationship between either the floral origin or the number of pollen grains of the honey and the diastase content. They suggest that the high temperatures occurring in many districts of California may account for the low enzymic content of the honey, and this view is supported in some cases by examination of the pollen present.

Sardine Canning

What is termed the "continuous broiling," as distinguished from the "continuous frying," method of sardine canning has been successfully developed in California. Briefly, the fish leaving the brining tank are packed in cans. The filled cans are mechanically conveyed to a special type of oven which forms the essential feature of the process and which is said to be a radical departure from anything hitherto utilised in sardine canning.

The Broiling Oven

This oven consists of three revolving "turrets" filled internally with shelves spaced about 6 in. apart. Between the turrets are transfer plates, and both these and the shelves are fitted with guides which control the progress of the cans. The three turrets revolve in the same direction and are enclosed in an insulated chamber.

Hot air from a brick furnace is blown by means of a fan through the turrets to supply the heat for the broiling process. The oven holds 2,500 cans, each of which takes 45 minutes to pass through the oven. Under certain circumstances it is advisable to intercept the passage of the cans through the oven to drain their contents before broiling is complete.

On emerging from the oven, the cans are automatically drained of oil and water, after which they are filled with brine or sauce and then closed in the usual manner.

Advantages

It is claimed that in contrast to the old method, with its drying, frying, cooking, steaming, and cooling operations that required about 24 hours, the broiling method occupies less than an hour from the time the fish start through the eviscerating machine to the changing of the cans into the retort for sterilisation.

German Preservatives

On another page we reproduce the preservative regulations which were proposed by the German Government's "Board of Health" at the end of 1932. Until they become law, which is expected at any time now, they are intended to serve as a guide. It is not anticipated that any important changes will be made in the final draft of these regulations.

The most striking feature is the inclusion of various esters of *para*-hydroxybenzoic acid and their sodium compounds, the latter being specially recommended for foodstuffs, as they are readily soluble in water. It is stated that the amounts of these esters to be used for preserving foods varies from 0·03 to 0·1 per cent., according to the composition of the food. Mixtures of several esters are more effective than a single one. The reason for this given by Dr. Erich Böhm, who was recently in London, and with whom we discussed the subject of these new preservatives, upon which he is an acknowledged authority, is that bacteria, moulds, and yeasts exhibit varying degrees of resistance to the individual members of the ester series.

Toxicity

Granting the efficiency of the *para*-hydroxybenzoic esters as germicides, the first question arising in the mind of the cautious Englishman is, "What about the toxicity of these substances?" This was, in fact, the very first question that we put to Dr. Böhm, and he replied by referring us to the very large amount of research work that has been carried out in Germany.

It seems that a basis was supplied by a review which was made of the relationship which exists between the chemical structure of preservatives and the death rate of micro-organisms on the occasion of a gathering of scientists and medical men at Innsbruck in 1924, reported in the *Pharmazeutische Monatshefte*, 1924, vol. 5, p. 285.

The subject was taken up again at the meetings of the German chemists at Dresden in 1928 and Breslau in 1929 (*Zeitschrift für angew. Chemie*, 1928, vol. 41, p. 621; *Pharmac. Act. Helv.*, 1928, vol. 3, p. 103; *Zeit. angew. Chemie*, 1929, vol. 42, p. 936).

Other references to important literature will be found quoted on another page of the present issue.

The claim is made that these esters are less toxic to man than other preservatives commonly used. It should always be borne in mind that the degree of toxicity of a substance with regard to micro-organisms does not necessarily mean that it is equally toxic to man.

Possibilities

It is well to keep an eye on the manufacture of certain of the newer chemicals and their application to foodstuffs. The action of maleic acid as an antioxidant in inhibiting rancidity has already been discussed. It is effective in one part to 10,000 parts of fat. Maleic acid is now produced in U.S.A. by the vapour phase catalytic oxidation of benzene.

Fumaric acid has been proposed as an ingredient of baking powders.

Inactive malic acid is an acidulent for use in beverages, jellies, and sweets. Its acid taste is said to blend perfectly with the flavours commonly used, and it is less astringent than tartaric acid.

By the addition of calcium malate to wine, even when young, any desired proportion of tartaric acid can be removed as insoluble calcium tartrate.

Diethyl succinate is being increasingly used for the solvent extraction of flavours from fruits and herbs.

An International Congress in Paris

This (the Third International Congress of Agricultural Chemistry and Food Technology), organised by the French Ministry of Agriculture, will be opened by the President of the Republic, accompanied by members of the Government, on Monday, March 26, and promises to be a particularly brilliant affair. It terminates on March 31.

The Congress will be divided into 23 sections and sub-sections, including those relating to the sugar, fermentation, brewing, spirits, wine, vinegar, milling, baking, starch, glucose, dairy, chocolate, oils and fats, and fruit and vegetable industries.

There will be an exhibition of appliances and products. Arrangements have been made for visits to local factories and other places of interest.

To members of the Congress the French railways are allowing a 50 per cent. reduction in fares, and a reduction is also made by the Southern Railway.

Dr. H. B. Cronshaw, the Editor of FOOD MANUFACTURE, has been nominated by the Food Group to represent the Society of Chemical Industry at this Congress. For full particulars application should be made to: Monsieur H. V. Dupont, Le Secrétaire Général, 156, Boulevard de Magenta, Paris, 10e.

GLASS CONTAINERS

This article, written authoritatively from the American point of view, shows very clearly how the U.S.A. tackles difficulties associated with the packing of foods in glass

THE RAPID development, during the last fifty years, of the tin can as a container for hermetically sealed foodstuffs has tended to obscure the prominent part played by glass containers in the establishment of this industry. Nicholas Appert, whose classical work on the art of preserving foods, published in 1810, is regarded as the first step in the development of the canning industry, selected glass as the material most impermeable to air and therefore most suited to his purpose. However, the economical and mechanical advantages of the modern hygienic can have led to the adoption of the tin can as the standard container for staple preserved foods such as fruits, vegetables, meat products, and the like.

Comparison with Tin

Nevertheless, the glass container possesses many inherent advantages. Transparency is not the least of these, particularly where the product presents an appetising appearance. A high quality article packed in an attractive glass container justifies the claim that the product is its own salesman. This is one reason why glass has always been preferred by manufacturers of jams and jellies, pickles and chutneys, sauces and catsups, salad dressings, vinegar, and the like, where the physical characteristics of the foodstuff appeal directly to the eye of the prospective purchaser. The resistance of glass to corrosion or chemical action by the foodstuffs packed is another valuable feature; but this advantage, together with that of impermeability to air, cannot be fully developed without the aid of modern hermetic seals or closures, which will be discussed later.

The initial cost of the glass container and the higher transportation costs brought about by the greater weight and comparative fragility of glass compared with tin make it necessary to obtain a premium for glass packed products, although this does not seem to be a serious objection where high quality merchandise is concerned. Difficulty is also experienced in the actual handling of glass in the factory, due to fragility, lack of uniformity, and other causes, and it is the main purpose of this

discussion to indicate the steps which have been taken in the U.S.A. in dealing with this particular phase of the problem, with the thought that something of interest for English readers may be introduced.

Conditions in U.S.A.

It is probably true to say that until recent years the proportion of glass containers to tin containers for foodstuffs was higher in England than in the U.S.A. and that a greater variety of food was packed in glass in England; bottled fruits, bottled soups, fish and meat pastes are rarely found in glass in the U.S.A. On the other hand, where glass containers are used in the States they are handled with efficiency and economy. Jams, tomato catsup, vinegars, syrups, pickle products, peanut butter, and other specialities are filled into glass containers, sealed on automatic machinery, sterilised where necessary, cooled and labelled, at speeds of 60 to 100 containers per minute, with the total breakage from all causes running less than half of 1 per cent. and with hold-ups of mechanical equipment due to failure of the glass container practically eliminated. Close and continuous co-operation between the glass manufacturers, equipment manufacturers, and manufacturers of closures and sealing machinery has been essential in attaining these conditions.

Standardisation

The first link in the chain is the glass container itself. Glassware for food products must combine to a high degree the properties of chemical resistance to the foodstuffs packed, thermal resistance to the shocks of sudden temperature changes, and mechanical resistance to rough handling. Furthermore, transparency and lustre cannot be neglected. Rigid chemical control of the composition of each batch of glass is maintained by the progressive glass bottle manufacturers, and in many instances the operations of mixing and melting the glass batch are largely automatic as well as scientifically controlled. Accuracy and uniformity of the container, particularly of the finish or portion where the seal is to be made, are of paramount importance for efficient handling by the food manufacturer. The general adoption of fully automatic bottle-making equipment makes it easier to attain the desired accuracy and uniformity, while at the same time it brings about reductions in costs and economies in operation.

Rigid specifications have been established for dimensions and for weight and capacity for each and every kind of bottle. The Glass Container Association, representing the bottle manufacturers and the closure or cap manufacturers, has established specifications for the dimensions of the glass finish for each diameter opening of every standard type of closure, and the food manufacturer will usually draw up his own specifications for design, capacity, and the like. Systematic inspection of these important features is continuously carried on by the glass manufacturers, as failure to come within the tolerances of the Glass Container Association, and other specifications, is liable to cause rejection of the consignment by the food manufacturer who receives it. The large glass manufacturers maintain an extensive organisation to check up on these points, samples being taken at periodic intervals from each mould or cavity of each bottle-making machine and checked against standards for finish, weight, and capacity. Within recent years the tendency has been for the manufacture of glass bottles to be concentrated in fewer and fewer hands, which makes for greater economy and uniformity and simplifies matters for the food packer.

Glass Container Association

The activities of the Glass Container Association have been of considerable benefit in the development of glass containers for the food industry. This association, which is composed mainly of manufacturers of glass containers and manufacturers of caps and closures, has been chiefly responsible for the working out of accurate specifications for bottle finishes for the various types of closures in use and has in this way made possible the attainment of a high degree of efficiency in the sealing operations of the food manufacturer. The association has maintained research laboratories which have carried out extensive studies on the packing of all kinds and varieties of food products in glass, so that prospective users of glass containers can obtain advice as to the best methods of handling their products in order to obtain the best results. The association has also sponsored advertising campaigns stressing the advantages of glass containers and pointing out the high quality of foodstuffs packed in glass.

Closure Difficulties

Caps and closures are also supplied by organisations national in scope; the large production and high degree of flexibility of these suppliers makes it possible for the food packer to obtain his closures very economically even if he requires a highly decorated cap lithographed in several colours. Many English food manufacturers who make their own caps as well as their own cans will probably

envy their American counterparts, who are able to devote their energies to their own particular technical problems without worrying too much about the mechanical features of their containers or closures. Naturally enough, the co-operation between glass manufacturer and closure manufacturer is not always perfect, but any difficulties which arise are usually straightened out with a minimum of inconvenience to the food packer. If for any reason the number of "leakers" or bad seals runs more than half of 1 per cent. (assuming, of course, that product or manufacturing process is not at fault), then there is evidently some unusual variation in either the glass container or the cap, and in general the trouble is rectified by the offending party without loss to the food manufacturer. By continuous co-operative effort a high standard of uniformity has been attained in weight, capacity, and accuracy of finish.

Care in Manufacture

Another important feature in glass for food products is resistance to sudden temperature changes. In many cases jams, tomato products, and the like are filled at temperatures of 190° F. or more, sealed, sterilised, and cooled in a continuous sequence of operations at speeds up to 100 per minute, and this calls for rapid temperature changes in the body of the glass container. The chemical composition of the glass must be carefully controlled in order to obtain this property. The actual moulding of the glass must be so designed and operated that uniform thickness of walls is attained as far as is practicable. The actual design of the container itself must take into consideration the question of the internal strains likely to be set up in the glass container during the moulding and cooling operations.

View inside a Glass Factory, showing Glass-Blowing Machinery.

(Courtesy of Owens Illinois Glass Company, Toledo, U.S.A.)

Finally, and probably of the greatest importance, the cooling down process of the glass bottle after it is moulded must be scientifically carried out. Up-to-date glass factories have installed thermostatically controlled annealing ovens or lehrs, through which the glass bottles are conveyed, passing gradually through successively lower temperatures until finally they are discharged to the inspection stations at a temperature cool enough to handle easily. The containers are subjected to a final inspection at this stage for cracks, blemishes, and other defects before being packed for shipment and storage. Periodically, samples from the end of the lehrs are given a "shock" test if they are to be used for hot packed products, filling them with water at 200° F. and immersing them, still filled with hot water, in water at about 120° F., thereby simulating heat changes likely to be met with in practice. Periodical optical examination of the cooled glass is also carried out by progressive glass makers to determine if internal strains are present.

Transport of Glass

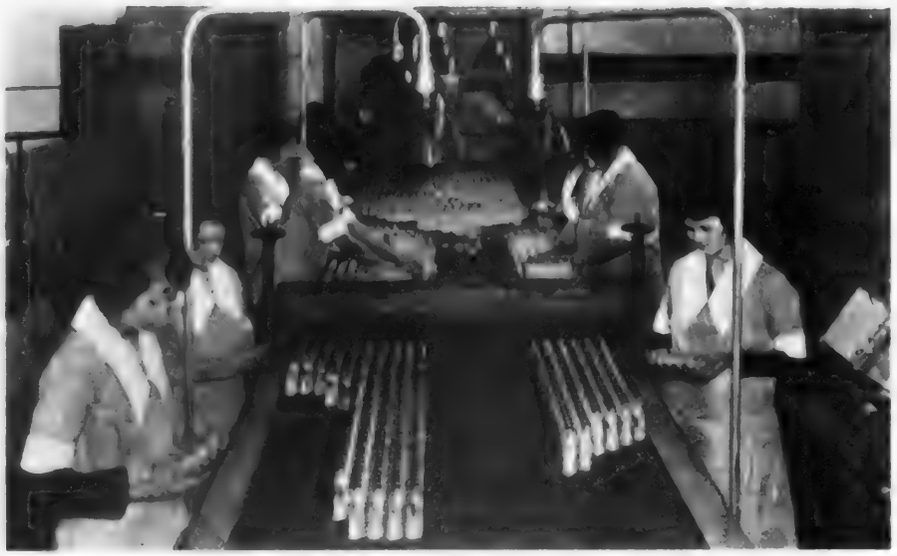
The glass bottles are usually packed direct into fibre board cartons, which are used for shipping the glass to the food manufacturer and are used by the food packer for shipping finished products to his customers. This means that the glass is usually quite clean when the food manufacturer receives it. All that is necessary is to remove the "lint" or loose fluff which rubs off the inside of the cartons. This is done by means of a special air-blowing device or more commonly by a bottle rinsing machine using hot water. Powerful bottle washing machines are not needed by the average American food manufacturer. This system for the delivery of glass also reduces breakage to a minimum; partly for this reason and partly due to high transportation costs, there is very little trade in "cullet" or broken glass in the States. The bottle washing problem of the average food packer is also simplified in that "returned empties" are almost unknown, due chiefly to the high collection and transportation costs which would be involved for any manufacturer except one operating on a local scale. Dairies and beverage bottlers are the only unfortunate operators who need the efficient bottle washers which are available.

Filling the Container

The glass bottle having safely arrived at the food factory, the first operation after rinsing is filling. Wherever possible, machine filling is used; in fact, many products are filled by machine which to English eyes would look better if filled by hand and would probably well repay in improved appearance the small extra cost involved. However, with the aid of a little ingenuity and study the makers of filling machinery will work out special adaptations to fill almost any product, but as most of the filling machinery used in the States is fairly familiar in England we will proceed to the capping or sealing stage.

Selection of Closures

Metal caps or closures are found on almost all glass-packed foodstuffs in the United States. Tie-over jars or corked bottles are rarely found except with imported packages. Probably the chief reason for this is the fact that the metal cap, applied by automatic or semi-automatic equipment, fits in much better with the high-speed, straight-line production which is characteristic of American food factories (a characteristic which, by the way, sometimes causes quality to suffer for the sake of quantity). Furthermore, the variations in climatic conditions, which must be met by any manufacturer with a national distribution, call for a cap which will offer the maximum protec-



Inspecting Bottles emerging from the Lehrs, or Annealing Ovens.

(Courtesy of Owens Illinois Glass Company.)

tion to the product. Bottles from the same batch may be exposed to arctic conditions in the winter months in the Northern States and tropical conditions in the Southern States, with variations in humidity as great as variations of temperature.

The result is that except for products which have a comparatively local distribution or which have a rapid turnover, closures which afford a completely hermetic seal are in demand. Increasing competition among cap manufacturers has produced many closures which stress ease of opening and closures which have a resealing value after the package has once been opened, both these features being of considerable importance to the ultimate user of the package in the household.

In general the food packer rents his sealing or capping machinery from the cap manufacturer on the understanding that he will purchase a specified number of caps over a stated period. In this way the packer is able to take advantage of improvements in caps and sealing equipment as they become available, and the cap manufacturer is assured of a steady market (more or less) for his caps.

In selecting a cap for his product the manufacturer must take many factors into consideration. If the product is liable to deteriorate or spoil in the presence of air, then a hermetic seal will be necessary, usually accompanied by the creation of a partial vacuum in the container either by sealing hot in the case of products filled hot, or by sealing in a partial vacuum in the case of cold-filled products.

Special lacquers or liners must be used for acid products such as pickles and vinegar. The degree of protection it is desired to give the product must be balanced against the cost of the closure and the possible difficulties likely to be experienced by the ultimate consumer in opening the package.

The desirability of providing a reseal after the initial opening of the package must be taken into account. Various manufacturers may select different types of closures for similar types of products, depending on the relative importance in their own particular trade of these factors.

Types of Closures

Considering first of all caps which form a truly hermetic seal, we find that tinplate is the basis for most of the caps, although aluminium is also used. With hermetic seals no liner of waxed paper or similar material is used, but the inner surface of the cap is lacquered with an acid-resisting lacquer, or, for more corrosive products, such as some types of pickles, it is given a coat of special enamel. The outer surface of the cap may be a plain lacquer or may be lithographed according to the fancy of the food packer. The actual seal is effected in various ways, depending on the construction of the cap.

The Phœnix band cap is used in the States, but differs from the Phœnix style caps used in England in that the disc is of lighter gauge metal and the seal is formed by means of a plastic rubber composition flowed into position on the cap, and not by a comparatively hard rubber ring. This disc is protected by a screw cap instead of a band in another style of closure. Caps of this type are usually employed with a hot, sealed product, the heat softening the rubber composition slightly so that as the product cools the disc is pulled inwards and the rubber composition compressed on the upper rim of the glass, aided by the tension on the band or screw cap, while the soft rubber takes up minor inequalities of the glass surface. These caps can also be applied under vacuum, using a special rubber composition.

One-piece caps of various kinds are also popular. These consist in general of a lacquered metal cap with a heavy vulcanised rubber gasket fitted into the skirt of the cap. The seal is formed by crimping or compressing the gasket tight against the side of the rim of the glass container; usually this side rim is formed according to careful specifications to ensure maximum tightness of grip for the cap. The Anchor cap is one example of this type, and may be applied direct to hot-sealed packages or may be applied under vacuum to cold-sealed packages. The White cap is a recent development of this class, but in this instance there is a " pry-off " ring moulded on the glass, placed so that a knife or other instrument can be inserted to lever off the cap and thereby prevent deformation during removal of the cap, which can then be used as a reseal. A machine has been developed for applying these caps in an atmosphere of steam, which has the effect of " vacuumising " and at the same time assists in sterilising the cap, air space, and surface of the product. The Hazel Atlas cap is a one-piece aluminium cap which effects a seal by a rubber gasket pressed against the

contour of the side rim of the jar. A tear-off tab on this cap offers an easy method of opening.

There are many types of screw cap available, some of which belong to the class of hermetic seals. Two-piece screw caps usually belong to this class, consisting of a lacquered metal disc with a rubber gasket which forms the seal, held in place by a threaded ring which engages with threads or protruding lugs on glass surface. Screw caps with a liner made of pulp or cardboard faced with a paper disc are widely used for mayonnaise, pickles, and other products which have a relatively high rate of turnover and which are not expected to remain unchanged over any long period.

Caps for Narrow Mouth Containers

For narrow mouth containers the most popular seal is probably the crown cap, which forms a very good hermetic seal provided the composition cork liner is properly made and that the crown is properly crimped on the glass finish. Special liners are used for products which are likely to cause disruption of the cork or which may take up off-flavours from the cork—*e.g.*, paper liners with cereal beverages, tin liners with catsup and syrup, aluminium liners with tomato juice. Special types of crowns with composition rubber or cork gaskets have been developed for wide-mouthed containers. A recent innovation is the Darling closure, which consists essentially of a wide-mouthed crown cap with a metal lever attached to the glass, which can be used to pry off the cap, and thereby provides a simple method of opening without deforming the cap, which can then be used as a reseal. The familiar R.O. caps, which are moulded to the contours of the threads in the glass finish by the operation of the sealing machine provide a seal which is practically hermetic under most conditions. The Goldy cap made by the same company affords a completely hermetic seal as long as the composition cork liner remains intact, and the tear-off tab of the aluminium band holding the disc in place provides a desirable easy opening feature. Special liners for different products increase the efficiency of this seal, which is used chiefly for hot sealed products such as catsup and is usually protected by an outer screw cap, which can be used as a reseal. The selection of the cap to be employed for each product he makes will play a very important part in determining the success of the food manufacturer with the glass container.

Labelling

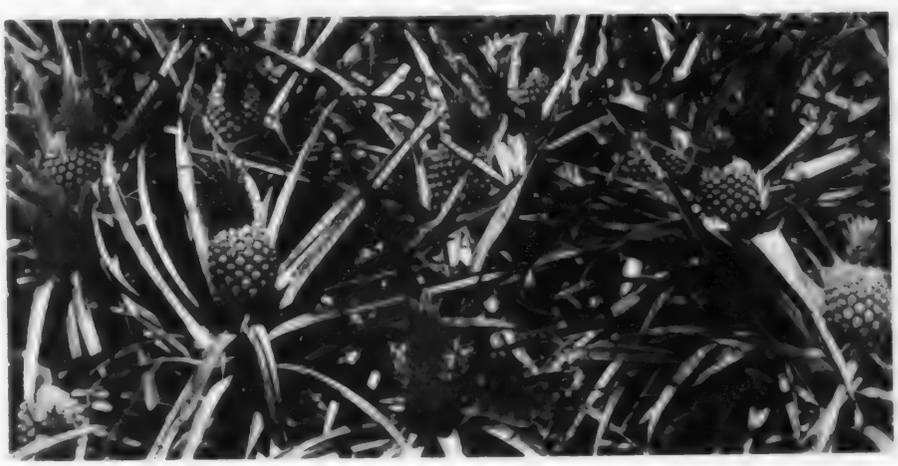
After filling, many glass-packed products proceed direct to the labelling machines, and, after labelling, they will be packed directly into the cartons or shipping containers. Automatic or semi-automatic labelling machines are usually employed, depending on the volume of production of each size handled and the design of the package. Some manufacturers prefer hand labelling, which is claimed to produce a better appearance when properly carried out than machine labelling, particularly where unusual non-standard shapes of container are in question.

Sterilisation

Some products, such as jams, tomato juice, some types of pickles, and the like, are pasteurised or sterilised before labelling. Where the sterilisation is carried out at temperatures of 212° F. or lower the containers are usually conveyed through an open water bath in trays or by means of special slat conveyors. Products containing meat, vegetables, or fish, including many prepared foods of the ready-to-serve type, are sterilised at a temperature of 240° F. In this case the sterilisation is carried out under water in closed retorts, using counterbalancing air pressure in the retort to prevent unseating the cap. The cap manufacturers have worked out standard processing procedures for various products and devised retort installations which ensure uniformity of temperature in the retort, together with automatic pressure and temperature control. By this means glass-packed meat and vegetable products can be sterilised at 240° F. and cooled rapidly under water with no risk of breakage or loss of caps. The development of these systems has led to the use of glass for products such as spaghetti, chicken products, shrimp, vegetables, and the like in recent years.

Cooling

After processing, rapid cooling is, of course, desirable in all instances, and the product is then ready for labelling and casing in the usual way. In general the containers are handled on conveyor systems as far as possible through the filling, capping, and labelling stages, in order to keep handling costs at a minimum. It is the development of the glass container and closure to the degree of accuracy and uniformity necessary to enable the attainment of this straight-line product which deserves the attention of the English food manufacturer.



An Excellent Crop of Pineapples Growing in Cape Province.

(Reproduced by courtesy of the African Canning and Packing Corporation Limited, Port Elizabeth.)

Canning Brisling in England

An account of the canning of brisling and sild recently commenced at Hythe, near Colchester, Essex.

THE MOST recent addition to British fish canneries is the Hythe factory of British Fish Canners, Ltd. This factory is admirably located as regards supply of raw materials and for the distribution of finished goods. It stands on the waterside, and is served by railway lines running close to the factory on both sides.

The equipment and organisation of this factory is due to Mr. C. W. Banks, who was responsible for successfully building up the Norseland Canning Co., Ltd., at Leeds. Readers will recollect that we gave an account of this factory in the April, 1932, issue, to which reference should be made for illustrations of plant and equipment, for the latter is similar to that employed at the Hythe factory.

In the first place it should be explained that the term brisling refers to small, immature sprats, generally between one and two years of age. Sild are small, immature herring, about nine to twelve months old.

The brisling come from the inshore fisheries of Aldeburgh, Southend, and Brightlingsea, while the sild are brought from various places, according to circumstances.

The fish are unloaded from boats direct into the factory, the quantity amounting to about 10 tons of fresh fish a day. They are conveyed into the factory in wooden boxes. The output from this factory is about 50,000 tins of various sizes ($\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ of a pound) each day.

Whenever possible, brisling are packed in preference to sild, as they are a superior fish in all respects. They are more plump, deeper bodied, and of a more silvery appearance than the sild.

Washing and Scaling

The first operation is to pass the fish through a latticed cylinder or trommel, slightly inclined from the horizontal, and

rotating in a box of special construction to facilitate the collection of the fish scales. These scales have a market value for the preparation of silver-fish essence (or fish-scale essence) which has found a wide application in the preparation of varnishes for giving pearl-like effects. We are informed that the Germans used to take the whole of the Norwegian output, making a free gift of the machines to the canners in return for a contract for the scales.

Brining

After this treatment, the fish are transferred by means of wire-net scoops to the brining tubs, where they remain in brine of 20° for about 20 minutes, depending on their size, temperature conditions, and other factors.

Rodding

The fish, after brining, are scooped into wire trays in which they are conveyed to the rodding tables, where girls thread them on to rods by passing the latter through the eyes. The operation is carried out with the aid of an ingenious, yet simple, piece of equipment consisting essentially of a rectangular bar of metal split lengthways, the two parts being hinged below. The bar is fixed horizontally to one edge of a table. There is a series of 22 cup-like depressions in the top of the bar, which are cut through by the vertical plane of division. The fish are stood upon their heads in the cups, and the girl passes a metal rod through a hole running horizontally from one end of the bar to the other and arranged in such a position that the fish are thereby threaded on to the rod. The two parts of the bar are then unclamped by operation of a lever and the rod with its complement of fish removed.

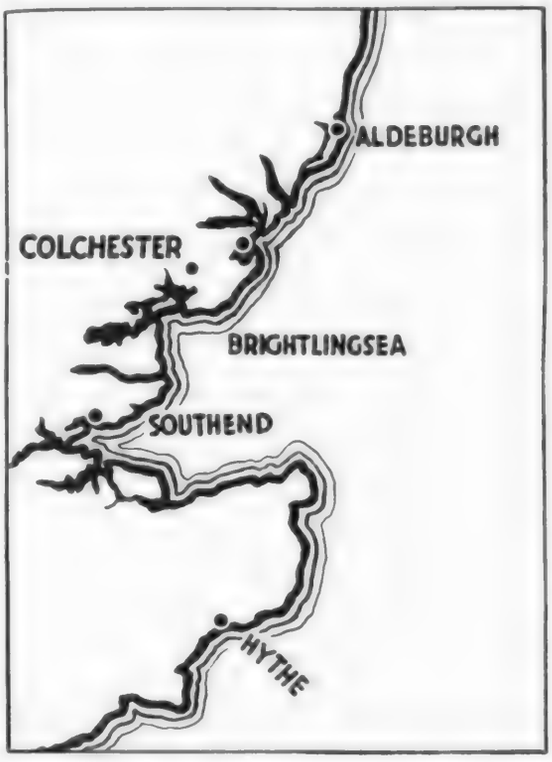
Twenty-seven such rods are arranged on a wooden frame. A girl can fill 50 to 60 of these frames a day.

Smoking

The frames thus loaded with fish are inserted horizontally, one above the other, into the smoke oven. There are three batteries of five ovens each, and an oven takes ten frames. A frame is first placed at the top of the series in any particular oven, and from time to time the positions of the frames are changed in order to secure uniformity of smoking. The total time during which the frames are in the oven varies from about 30 to 40 minutes, depending on the size of the fish.

Head Cutting

The frames, after smoking is complete, are stacked on a truck and brought alongside an ingenious machine for decapitating the fish. In principle this consists of a grid upon which a frame is placed and between the bars of which the rows of fish hang vertically, with their heads projecting above the upper surface of the frame. The grid, bearing the frame, is then pushed forward against a triangle-shaped sheet of iron arranged horizontally just above the level of the frame and having its oblique edge set close to a band knife. The result is that the heads are cut off and left above, while the bodies drop through on to a conveyor. Six hundred fish are beheaded in 5 seconds.



Packing

The fish are elevated in metal trays to the floor above, where they are delivered on to a double-band conveyor traversing the length of the packing-room, passing between two lines of packers who are seated at ten packing tables, four girls to each table. These girls take the loaded trays from the upper conveyor and pack the fish according to their size into the various sized cans. The empty trays return on the lower conveyor to the head of the elevator, where they are washed and cleansed and returned to the head-cutting machine in the room below.

Oiling and Tomatoing

The filled cans in their trays, after they have passed the scrutiny of the "passers" or examiners, then receive their quota of olive oil or tomato sauce from specially designed filling machines.

Closing

The cans are removed from the trays, which are stood in a tank to drain and recover the spilled oil, and they are closed on a double-seaming machine at the rate of 2,500 tins an hour. This particular type of closer avoids any trouble due to the presence of the tab for opening the can.

Retorting

The closed cans are passed down a chute to the sterilising room, where they are loaded into baskets for charging into a couple of ver tical pressure retorts.

Washing and Degreasing

After emerging they are passed through an ingenious washing and degreasing machine of a type which is new to this country.

From this they are delivered on to a steam-heated elevator, which imparts sufficient heat to the cans to enable them to dry when packed into wooden boxes.

It should be mentioned that the cans and wooden boxes are all made on the premises. The only thing that is not made at present is the key for opening the can.

CANNED MEATS

Their manufacture and technical control described by T. Crosbie-Walsh, F.I.C., F.C.S.

THERE APPEARS to be evinced an ever-increasing interest in the canning of meat products in this country, and quite recently considerable publicity has been given to the question as to whether the manufacture of corned beef and its allied products on a comparatively large scale is feasible. This matter is rendered still more interesting by the recent proposals regarding quotas.

Most of the corned beef and canned tongues come from the Argentine. These products are also manufactured in New Zealand and Australia, but the consumption is mainly domestic or it is distributed among the islands of the South Pacific. South Africa is also manufacturing and is likely to produce more.

It has been suggested that the South American corned beef is in the nature of a by-product of the freezing works, but, as the author stated in a recent article in *Food Industries Weekly*, there exist large factories whose sole activities are connected with the manufacture of corned beef and its by-products.

Given the possibility of reasonable profit, there is no reason whatever why similar factories should not be started in this country and why every possible advantage be not taken of the many items which by their manufacture as by-products would cheapen the price of the main article—*i.e.*, the raw beef for corned beef.

It has been stated in the daily press that there are 500,000 dry dairy cows per annum available for canning. A factory killing from 75,000 to 100,000 head a year would be by no means a small one, it being taken for granted that the season would probably not last all the year round.

The possibility of utilising Empire frozen beef for canning should not be ignored. The idea of canning such may appear revolutionary at first sight, but by the utilisation of special methods a good and saleable product could be obtained, as has been demonstrated by the author on a small industrial scale in New Zealand. Quite a number of frozen ox tongues are canned in England, and the product is an excellent one where proper measures are employed.

Yields

In examining the possibilities of corned beef manufacture in this country a careful examination of the yields to be obtained from the animal used (1) for corned beef and (2) for butcher's dressed beef will be useful.

If the average live weight of a dry fat cow be 9 cwt., the following yields would be expected: Total meat without bone, 413 lb., or 41 per cent.

Of this meat about 84 per cent., or 347 lb., could be utilised for corned beef.

Trimmings of beef and sinews would account for from 11 to 12 per cent. of the total meat, and 4 to 5 per cent. would be raw fat trimmed from the meat.

This raw fat could, of course, be left in association with the meat and would find its way into the can, but the result would be an unduly fat product.

The yield of corned beef from raw beef ranges from 67 to 70 per cent., or from 38¾ to 40 6-lb. cans per head, or 3·23 to 3·33 cases per head.

The following by-products would be handled: Tongue, hide, tallow, premier jus, cooking fat, marrow fat, neat's-foot oil, blood, tankage, bones, horns, sausage casings, brains, kidneys, sinews, hoofs, piths, ox gall, hair, glands for medicinal purposes, etc.

The trimmings are in sufficient quantity to warrant treatment for by-product extract of beef. The bones, with their small but significant proportion of adherent beef, are specially treated for the same product. The soups proceeding from these are mixed with those from the cooking of the beef for corned beef.

The manufacture of extract of beef from the various materials is a highly technical matter and has evolved after extensive and protracted research. The taste, physical properties, and analysis have been largely standardised, and an extract not adhering closely to the required standard is unsaleable.

Various grades of soup stocks may be made from bones (whether treated previously for extract or not) and other materials, after which these go to such products as mixed fertilisers or bonemeal.

It has been stated that there exist something like 60,000 small private abattoirs in this country from which a huge amount of valuable products are going to waste. The centralisation of abattoirs throughout the country will obviate this waste and also admit of the inclusion of canned meat product manufacture under conditions somewhat different from the factory run exclusively for canning.

The yield of dressed butcher's beef from the dry cow under discussion would be approximately 55 per cent. on the live weight, but the beef would be of inferior quality. It has been stated that it is "too tough to be sold as beef." In any case, to strike a balance offhand would be difficult. The mere fact of the absorption of surplus dairy cows might well modify to

a considerable extent the class of meat handled by the butchers, and many other factors may be introduced.

It may be emphatically stated that fat cows would make excellent corned beef if the whole of the animal is taken and the best cuts not diverted to other uses.

Corned beef as an article of diet is not unattractive. As a cold meat it is more tasty than a slice of cold meat cut from the inevitably small joint of the average family.

It can be bought in very small quantities. There is no waste. It is much cheaper than fresh roast beef bought in a *delicatessen* shop, which is almost prohibitive in price to the working classes.

Conditions of Success

Enough has been said above to suggest that, with such a multiplicity of by-products, success must lie in efficiency in handling the proposition *as a whole,* but why it has been stated that this could not be done in an industrial country like England—viewing it for the moment solely from the manufacturing standpoint—is difficult to understand! It goes without saying that yields and quality would have to be strictly controlled—perhaps more strictly than is customary in similar operations, owing to an admittedly narrow margin in any case.

The composition of a standard South American corned beef is closely controlled. A good analysis is the following:

Moisture	56 per cent.
Fat	15 ,,
Salt	2·5 ,,

Dry fat cows would readily afford a product with a similar composition.

The British consumer's preference tends towards a lean pack, while on the Continent a fatter pack is preferred. In this country any product containing above a certain degree of fatness appears to be looked on askance and the fat viewed somewhat in the light of a makeweight or adulterant.

Effects of Cooking

There appears to be some misunderstanding on the part of some meat canners as to the precise effect of the cooking of meat and other flesh products. The general effect is, of course, the elimination of moisture in the muscular tissue.

In order to obtain precise data on the matter, two series of experiments were made with meat cut for corned beef. Raw pickled beef was boiled in the usual way with the following results:

Boiling Time (Minutes).	*Series 1. Loss per Cent.*	*Series 2. Loss per Cent.*
5	19·20	19·75
10	28·18	30·75
15	35·28	36·54
20	39·46	39·01
25	41·54	41·97
30	42·59	43·46

Some interesting data were obtained with regard to the absorption and subsequent loss of moisture in beef fat associated with the beef used for corned beef.

During the pickling process, the fat absorbed no less than 17 per cent. moisture, and the following figures show the percentage of absorbed moisture retained after various periods of boiling.

Boiling (Minutes).	*Gain per Cent. on Raw Fat.*
0	17·00
10	13·90
15	11·50
20	11·50
25	10·60

After 15 minutes the weight of fat becomes temporarily constant. Subsequent loss is probably due to slight melting.

During canning operations it is often necessary to examine the best way to take advantage of the materials at one's disposal. For instance, whether it is best more severely to trim the beef, making a less fatty product and producing more cooking fat, or whether to leave such fat in the pack. The fact that fat gives a "plus" yield on cooking is an important one when viewed from this standpoint. In the preparation of cooking fat, the moisture is almost eliminated by subjection of the raw material to high temperature. While the excess weight in corned beef is merely moisture, it is so combined with the fat that it does not affect the firmness of the pack, which is one of the items to which the manufacturer must give a good deal of attention.

The advisability or otherwise of severe trimming of the fat from the beef for corned beef is here cited as an example of one of the many little problems which confront the canner. He oft-

Jersey Cattle at Wanora, in the Brisbane Valley.

(By courtesy of the Agent-General for Queensland.)

times must modify his procedure to meet varying prices of his commodities.

Hanging

The hanging of the beef has a definite influence on the quality and characteristics of canned meats. The subject has been treated by the author with reference to extract of meat in a previous issue of FOOD MANUFACTURE. It is an important item to be considered in connection with the design of a meat canning factory. Considerable space is required for hanging the beef satisfactorily and for sufficient time. No refrigeration is required, but the time of hanging would depend upon existing air temperature.

The yield of extract of meat with 20 per cent. moisture without added salt ranges from 2 to 3 per cent. on the raw beef cooked for corned beef. Other materials mentioned above would add a further 1 per cent. or so to this figure.

New Developments

General methods of manufacture have been greatly modified in the past few years. Very shortly prior to the outbreak of the Great War, the usual method was to immerse the beef in strong brine contained in wooden barrels and pickle it for about 14 days, the barrels being kept in a cold chamber, or, failing this, ice was added from time to time. The liquors were thrown away—both the pickling liquor and the soups resulting from the cooking of the meat. When war broke out, Governmental regulations forced manufacturers to reduce the salt content of the beef to a maximum of 3 per cent. Prior to this there was rarely encountered a product with less than 4 or 5 per cent. This forced a minor reconsideration of methods.

Another factor which influenced methods was the greatly increased demand for extract of meat. Very elaborate methods and plant were used for the recovery of extract from the salty liquors—mostly the cooking soups.

Recourse was had to de-salting plant, but unfortunately the final extract was much modified and quite different from that hitherto obtained from the extraction of fresh beef after the style of the process discovered by the chemist Liebig.

Many experiments were conducted to evolve a process whereby the beef be cooked before pickling instead of being pickled before cooking. At this date it appears a simple enough matter, but the lack of realisation of the rôle of saltpetre resulted in much floundering in the early stages. The product itself had a different taste, and some manufacturers were unwilling to venture too suddenly into new fields in connection with such a long-standing product as corned beef. Certain characteristic flavours were developed by bacterial action in corned beef made by immersing raw beef in pickle. These flavours were noticeably absent when the raw beef was cooked first and then pickled. However, as the demand for extract increased, the majority of meat canners adopted what is known now as the "hot process," and this process has been so improved and modified that something very near to the original type of corned beef is obtainable.

(*To be continued.*)

FOOD COLOURS

To the Editor.

DEAR SIR,

As an American reader of your journal, may I be permitted to add a few remarks to the interesting discussion on the question of a Permitted or a Prohibited List of Colours for Foodstuffs?

To my mind, there can be no doubt that a carefully selected Permitted List of colours for food products is to be preferred to a Prohibited List. Presumably the objective of all rules and regulations for food products is the protection of the health or purse of the ultimate consumer, and it seems to me that this objective is best attained from the point of view of colouring material by publishing a list of permitted colours which have been proved by the best scientific evidence available to be harmless. Certainly the consumer should be better protected when only permitted colours can be employed, and undoubtedly the job of the food manufacturer and the colour manufacturer is easier with a Permitted List, as they are spared the responsibility of deciding whether a new colour is likely to be harmful or not. The Permitted List in the U.S.A. offers an abundant choice of colours for all food products, and any desired shade can be obtained by blending various colours. New colours are added from time to time as they are developed and proved to be harmless. In the U.S.A. the federal regulations go even further than publishing a list of permitted colours. Each batch of colour manufactured must be analysed and certified by a qualified analyst, and at the same time a sample must be submitted to the Government for checking. The object of this is to make sure that no arsenic, lead, or other objectionable materials are inadvertently introduced into the colour during manufacture, as experience shows that colours harmless in themselves may easily become contaminated with poisonous doses of the heavy metals.

The most important question from the point of view of colour in food is the question of label declaration. It would seem that the consumer should be entitled to know if the food he buys contains added colouring material; where trade customs and requirements necessitate the use of colour, these should be no hardship to the food manufacturer, as all manufacturers using colour would be obliged to state this fact on their labels. If it is found that a label stating colour has been added awakens suspicion in the mind of the purchaser, then this should act as an incentive to the food manufacturer to develop better methods for the selection of raw material or for the manufacture of his product, so that the use of added colour can be avoided. This has been the actual course of events in the U.S.A., where various products, such as tomato catsup, canned fruits, jam, mayonnaise, and the like, which at one time were artificially coloured, are now manufactured with no added colour, and apparently with undiminished sales appeal.

Yours faithfully,

B. W. CLARKE.

BALTIMORE, U.S.A.

Non-Alcoholic
APPLE JUICE

In this, the third and concluding article of the series describing some products capable of manufacture from surplus British fruits, Mr. Vernon L. S. Charley, B.Sc., discusses the juice of the apple and its conversion into an attractive beverage.

IT IS impossible to delve into the dim and distant history of the apple and its juice without becoming lyrical. This fruit and its corresponding beverage have been famed from Grecian and Latin times, and have played no inconsiderable part in mythologies of both eras. The far-famed race between fair Atalanta and Hippomenes was won by the latter adopting the ruse of throwing the three golden apples of the Hesperides in the path of the damsel, and she, charmed by the luscious fruit, eased her pace to retrieve the tempting morsels and was beaten. Scandinavian lore includes the delightful story of the gods growing old and at intervals quaffing the frothing apple juice to retrieve their erstwhile vigour. To drink apple juice in those days was synonymous with immortality!

In more recent times the country parsons of the seventeenth, eighteenth, and nineteenth centuries were lavish in their poetic encomiums of cider, and it is interesting to recall that the whole question of apple production for cider, together with the complete details of the cider-making process, have been woven into a long poem by Philips —probably the only poetic "textbook" in existence. The various procedures are described in sumptuous phrases that invest the most menial tasks and commonplace experiences with romance and delight. At this period the yeomen of England fought on cider, the clergymen of England preached on cider, the poets poured out countless stanzas of praise on cider, and when, at long last, death intervened, they were all "buried" on cider, too!

But out of all this plethora of ancient lore comes the challenge from the days that are gone. A natural thought is one which is well expressed by a slogan adopted by a long-established London newspaper, "A thousand years' tradition can't be wrong."

In recent years a remarkable increase in the consumption of apple juice in the form of cider has taken place. The West of

England, the Elysian fields of true connoisseurs of cider, is now the centre of a definite revival in the trade; but whereas the consumers were previously derived from rural areas, the present classes of drinker are to be found in cities and towns of the industrial areas too. But the cider of olden days was a different drink from that which is produced to cater for modern tendencies. Philips says:

> "*Ye honest men, beware,*
> *Nor trust its Smoothiness; the third circling glass*
> *Suffices virtue.*"

It is surely not making too serious a leap in the dark to suggest that, in view of the general acceptance with which cider is being received to-day, there would be a considerable demand for a pure apple juice, free from alcohol and containing all the health-giving properties for which the apple is famous. Philips describes the cider of his day as the

> "*Delight*
> *Of curious palate, by fair Virgins craved,*"

and it is a point to be remembered in any publicity work that such beverages as are later to be described in this article will have their inevitable appeal to the feminine mind.

The cider industry is in difficulties over the question of obtaining sufficient fruit for its needs, and for this reason the new type of juice cannot be made entirely from cider apples. But the culture of the age-old vintage cider tree is localised to a few western counties, while in most parts of England there are supplies of other fruit suitable for being converted into satisfactory beverages. The orchards of Kent, Suffolk, and Surrey, as well as districts farther north, are annually providing surplus supplies of apples which, while being of no great use for the town markets, are admirably adapted for the purpose under consideration.

The problem presented to the Fruit Products Department at Long Ashton was an urgent one. How could this surplus fruit be made to yield some return to the grower? It is now confidently believed that their utilisation for the production of soft drinks will help the fruit grower and form a profitable undertaking for the manufacturer.

The problem has been studied from the technical aspect at Long Ashton,[1] and details of procedures which can be recommended are incorporated in the following general account of Continental and American practice.

"The Fruit."

> "*There are, that a compounded Fruit drain,*
> *From different mixture. Woodcock, Pippin, Moyle,*
> *Rough Elliot, Sweet Pearmain, the blended streams*
> *(Each mutually correcting each) create*
> *A pleasurable medley, of what Taste*
> *Hardly distinguish'd.*"

Most of the fruit available for this purpose will be "culls"—*i.e.*, low-grade culinary and dessert apples which for a variety of reasons are unfit for the housewife's table. These fruits will fall short of the desired standard for such reasons as excess scab and other bacterial or fungus diseases of the skin or flesh, together with badly shaped and undersized specimens. With these may be placed the large quantities of apples which through prevailing market and economic conditions cannot find purchasers at a price commensurate with the grading, packing, and other marketing essentials necessary for the disposal of high-class fruit.

The fruit, however, must not on any account be rotten or mouldy. Culinary apples, when compared with the recognised cider varieties, lack sugar and tannin (*i.e.*, astringency), but usually they contain an excess of acidity (as malic acid). This, to some extent, can be remedied by blending with a certain proportion of cider fruit, but, as explained above, this is only possible on a small scale, especially as the most acute shortage

Illustrations 1 to 3 demonstrate the clarification of fresh apple juice. Fig. 1, 1 per cent. pectinol. Fig. 2, 0·4 per cent. filtrations enzyme. Fig. 3, Control (photographed 24 hours after addition of enzymes). Fig. 4 shows natural clarification of strawberry juice (*vide* text).

of cider apples is being felt in the bitter-sweet (*i.e.*, high tannin) class. Acidity may often be balanced by judicious blending of juices, but this, too, is not always practicable. The several varieties ripen at such different times that while one would like to blend the sub-acid Worcester Pearmain with the high-acid Bramley's Seedling or Lane's Prince Albert, this is impossible on account of the two months which separate their seasons of maturity. Although it is not safe to be too dogmatic, it can be asserted that the best analysis for non-alcoholic juice should be:

Specific gravity	1·040–1·050	
Acidity (malic acid) ..	0·7 –0·85	per cent.
Tannin	0·10 –0·15	,, ,,

Dilution with water to reduce acidity is a possibility, but the inevitable reduction of flavour is a drawback (10 per cent. is the very limit to which water should be added). Calcium carbonate (pure precipitated) may be added at a rate of 2 lb. per 100 gallons of juice, and allowed to react for several hours, if some reduction of acidity is really necessary.

The increase of tannin content is not possible by any chemical means so far investigated. No astringent compound has been discovered which is satisfactory.

MANUFACTURING PROCESSES

The complete procedure falls conveniently into the following three main operations:

1. Formation of a coagulum.
2. Removal of deposit.
3. Maturation, carbonation, and bottling.

The essential features of these three sections will be briefly described.

1. Formation of a Coagulum

The filtration of a fresh apple juice is practically an impossibility. The pulp soon becomes choked and the yield negligible. The problem is to remove the slimy ingredients of the juice without simultaneously depriving the juice of some of its desirable characters. Fig. 4 shows a gallon jar of strawberry juice which in the space of twelve hours completely cleared itself without any outside treatment. The supernatant material was a close compact gel, while the lower layer comprised a brilliantly clear liquid. It has been the endeavour of workers at Long Ashton either to adjust the composition of apple juices to such an extent that the same spontaneous clarification ensues, or to induce such a phenomenon by chemical or physical means. These are enumerated below.

Heat Treatment[2, 3].—The fresh juice is held at 140° to 150° F. for a few minutes to coagulate protein and other colloids. The removal of material from the colloidal state is very incompletely effected by this means, and the likelihood of overheating and the acquisition by the juice of a "cooked" flavour are real dangers inherent in the method. "Flash" pasteurisation is used in U.S.A., it is stated, with great success.[4] The juice is heated to 180° F. for twenty seconds and immediately cooled.

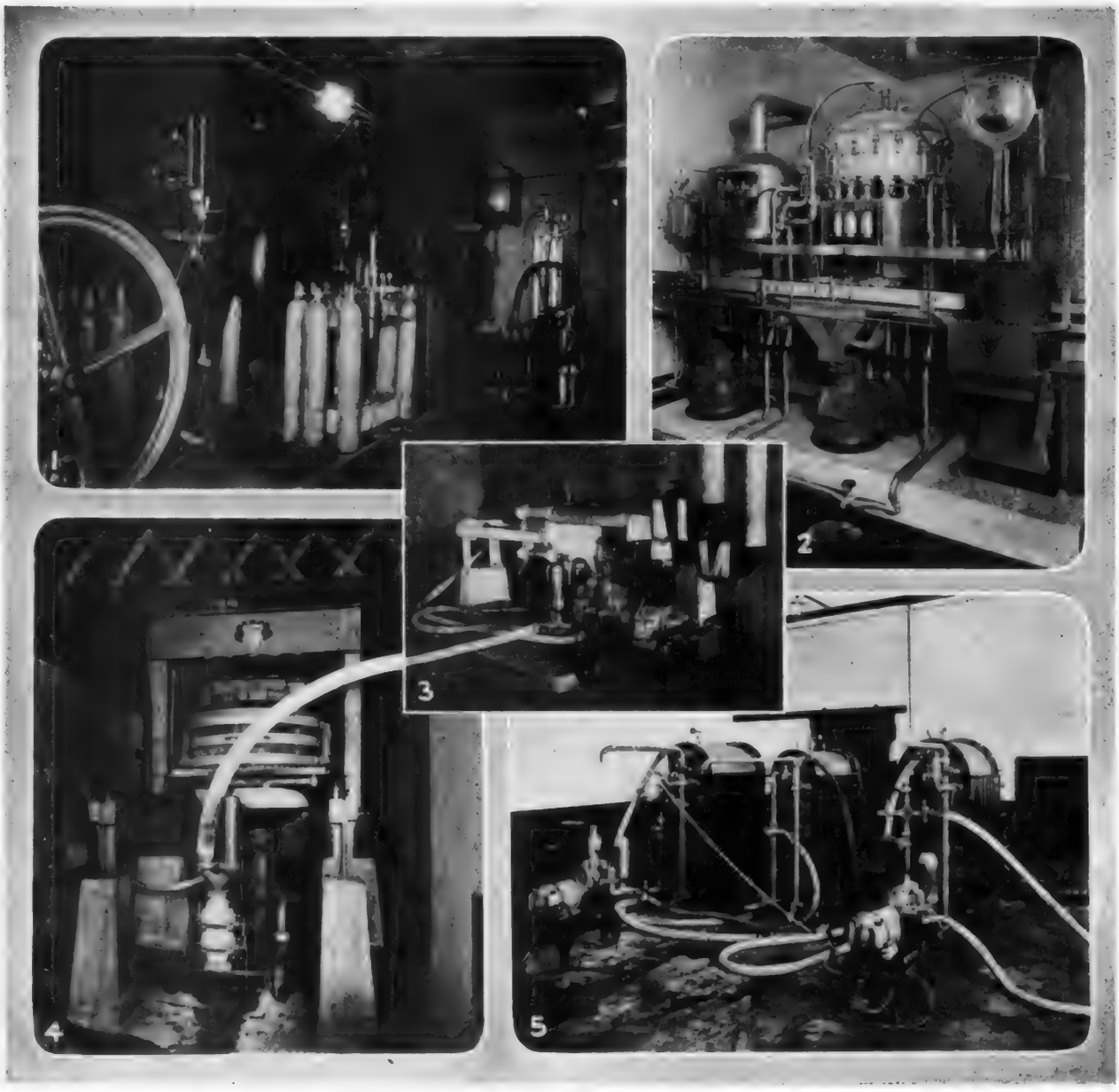
Chemical Precipitation[5].—This class of methods aims at producing a diffuse flocculent precipitate which, falling slowly through the juice, will occlude in its midst much of the colloidal suspensions of the medium. Among the host of substances suggested for this may be mentioned the following: Gelatin, gelatin+tannin, milk, white of egg, casein, and fish paste. Gelatin and tannin is the most popular treatment, and although its use is not free from objection, it does clear the juice effectively and quickly. Dissatisfaction is often expressed at the colour of the resulting juice, which is usually paler (a disadvantage with alcohol-free juices). The balance between gelatin and tannin additions must always be carefully adjusted. No definite quantities can be given, though in general 50 gm. tannic acid solution (added first, with constant stirring) and 100 gm. gelatin solution (pure sheet) per 100 gallons of juice will suffice.

Enzymes.—Commercial quantities of enzyme preparations are now available for the purpose of decomposing specific portions of the colloids. These have been extensively studied on a small scale at Long Ashton,[6] and the results have been such that the whole question is considered worthy of investigation on a large bulk of juice. The enzymes are obtained fixed on bran or pollards, which material is mixed into the juice in quantities varying with the proprietary article (0·2 to 1 per cent. weight/volume). One or two days are allowed for completion of reaction, and the juice is then filtered. "Pectinol"[7] is an enzyme specific toward pectin nuclei, and "Filtrationsenzym" is described as decomposing cellulose and pectin aggregates into simpler and hence more easily filterable units. The figure shows a test carried out on three gallon jars of apple juice, and the clarity of the juice after twenty-four hours is easily assessed by the visibility of the small numbers placed on the back of the jar. This process is safer if followed by pasteurisation of the filtered juice; otherwise there is danger of the enzyme continuing its action after filtration and causing a deposit in bottle.

Low Temperature Storage.—The writer, while visiting the chief fruit districts and research stations of Switzerland in 1931, and France in 1933, noted the frequent use of refrigeration for the processing of non-alcoholic apple juice. The fresh juice was stored at −2° C., and a natural clarification ensued during a month or six weeks, and after being racked from deposits the juice was returned to the vats for a further period for maturing, which varied from four to twelve months. This method demands a cheap source of power, but, given this, is a valuable means of keeping the cleared juice sweet during the very necessary maturing period.

Pressure Storage.—Swiss and German procedure is largely centred round the Seitz-Bohi process. The juice in steel cylinders is subjected to very high pressures of carbon dioxide and retained in such condition until clarification is complete. This process has been chosen for the modern and extensive factories recently built in South Africa for the production of very large quantities of alcohol-free grape and apple juice.

Natural Fermentation.—A slight spontaneous fermentation is of remarkable value in removing colloidal compounds; strict control is necessary, however, to keep the alcohol content within the statutory limit of 1 per cent. (by weight). Using the ordinary type of hydrometer (1·000 to 1·060) it is safe to allow fermentation to process until 6 to 10 points of gravity have been lost, the juice being immediately filtered. This affords a very satisfactory means of removing slime, but efficient fermentation control is essential for its success.



The New Grape Juice Factory of the Wine Growers' Association of South Africa Ltd., at Worcester, near Cape Town, which is claimed to be the largest and most modern of its kind in the world.

1. Thirty 11,000 gallon ebon-lined steel tanks in which the grape juice is stored for two months at 52° F. after being carbonated and previous to bottling. Plant for sterilising and bottling the juice at the rate of 3,000 an hour. 3. Plant for effecting a heat exchange, thereby cooling the juice from normal temperatures down to 28° F. preparatory to fining. 4. Crushing the grapes for extraction of the juice and pumping it into cement tanks. 5. Seitz filters for imparting a brilliant clarity to the juice.

2. Removal of Deposit

The deposit once formed, or the slime dispersed, the juice should be immediately filtered or centrifuged. Both methods are satisfactory, and the latter is of especial use where the fermentation process has been adopted. Some type of pulp or plate and frame filter is suitable for filtration, and should be used in such a way to yield a brilliant juice.

3. Maturation, Carbonation and Bottling

> "*Cyders in metal frail improve; the Moyle*
> *And tasteful Pippin, in a moon's short year*
> *Acquire compleat Perfection.*"

The question of securing adequate maturity in the filtered juice is indeed a thorny one. In the first place, it is exceed-

ingly difficult to retain large quantities of sweet juice in an unfermented condition unless very special apparatus and procedure is adopted. At the present juncture it is probably best to bottle the juice immediately after carbonation. Some maturity will be acquired during the six to eight months usually elapsing before the summer season's demands become active, and only connoisseurs are likely to note the slightly deficient flavour of the juice matured in bottle as compared with that matured in casks. German procedure (notably that associated with the Seitz-Werke firm) has been concerned with the storage of Seitz-filtered juice in casks. The process is difficult, but it is likely that the obstacles to its fuller acceptance will soon be overcome. (One of the greatest difficulties is to sterilise completely the inner surface of the cask.)

Apart from the maturity question, the procedure, once a brilliant juice is obtained, is determined by the process to be adopted to kill or remove the yeast cells of the juice. The pulp-filtered juice may be carbonated to 30 lb. pressure of CO_2 per square inch and pasteurised in bottle for thirty minutes at 150° F. On the other hand, the pulp-filtered juice may be passed through the germ-proof filter, carbonated in a sterile machine, and bottled into completely aseptic containers. (2 per cent. SO_2 solution is satisfactory as a sterilising agent for metallic and composition surfaces.)

Considerable differences of flavour may be found between juices treated in these two ways. The heated samples are always much deeper in colour, and possess fuller, heavier flavours than the Seitz-filtered samples. But undoubtedly the latter is much superior to the former by reason of its fresh fruit flavour, which it is quite impossible to attain by the pasteurisation method.

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MILK TESTING

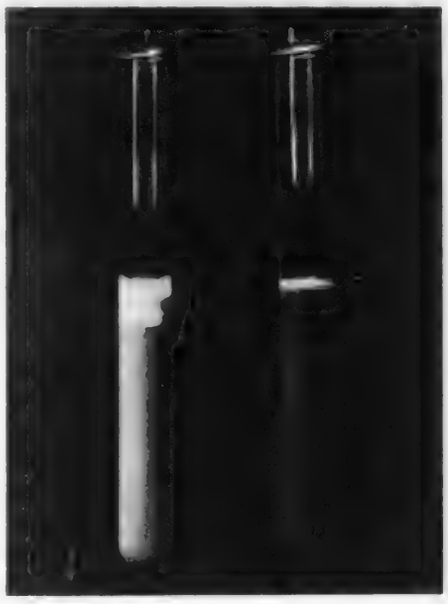
Determination of the Relative Keeping Quality of Milk, Based on Hydrogen Ion Concentration

ACCORDING to the theory of electrolytic dissociation, all liquids of which water is a constituent contain free positively charged hydrogen ions and negatively charged hydroxyl ions. A liquid is said to be neutral when the numbers of these two ions present exactly balance. Any chemical change which occurs in a neutral liquid and upsets this ionic equilibrium will therefore result in the liquid becoming either acid or alkaline, according to whether the new balance is in favour of the hydrogen ions or the hydroxyl ions. An observation of the change in ionic balance which takes place in milk on standing provides a useful indication, approximately and relatively, of the keeping quality of milk samples.

The samples to be compared are placed in ½-in. diameter test tubes, 5 c.c. of milk being taken in each case; 1 c.c. of bromo-cresol purple solution (B.D.H. indicator), which has a *p*H range of 5·2 to 6·8 is then added, the colour produced in normal milk being greyish blue.

During development of acidity, the colour change is from greyish blue, through green, to light yellow. The samples should be examined for change of colour every few hours in the case of natural milk, and every 12 hours in the case of homogenised milk samples.

A change of colour is generally perceptible in natural milk at the end of 24 hours, but the colour of properly homogenised samples usually remains practically unchanged for about three days. The development of acidity in either case is influenced somewhat by the room temperature during the period of test, and it is therefore important, where records of test results are kept for the purpose of comparison, that tests should always be carried out under the same conditions of temperature.



On the left is shown natural milk; on the right, homogenised milk.

The chief factor indicated by this test in relation to the keeping quality of milk is the development of acidity. The initial colour obtained by adding bromo-cresol purple to the samples is made lighter by the milk having been heated above the ordinary pasteurisation temperature, and by the presence of formaldehyde or acid preservatives. The behaviour of boiled milk differs from that of fresh, in a delayed formation of lactic acidity.

The illustration shows a sample of natural milk (A) and one of homogenised milk (B) after 48 hours' test, and affords an interesting indication of the remarkable stability and keeping quality imparted to milk by homogenising, brought about by the greatly increased dispersion of the fat globules and their consequent absorption of casein.

G. H. WRAY.

CYPRUS

An Empire Source of Food Supplies

A review of the present position and future possibilities of the canned, preserved and other food industries in the island, by A. Pitcairn, Assistant Director of Agriculture, Cyprus.

THE GREAT variety of fruits and vegetables which are produced in Cyprus and which appear on the local market at different seasons of the year tends to lead the casual observer to suppose that there are immediate possibilities of developing a canning and preserving factory on a fairly extensive scale. However, the canning and preserving of fruits and other foodstuffs in the island is as yet in the experimental stage, and, apart from a few domestic canning and preserving establishments, a small demonstration factory recently erected at Kyrenia, and certain demonstrations and experiments carried out by the Department of Agriculture, no special efforts have been made to stimulate a business in canning any of the island products on a commercial scale. There is, however, a certain amount of activity in progress in connection with the extraction of citrus juices by local firms in Famagusta, and it may be of interest to record that a few years ago a well-known firm established a factory at Famagusta for the manufacture of concentrated citrus juices for export to the United Kingdom. Unfortunately, this firm was obliged to close down after some ten months' operating under adverse conditions, which were mainly a lack of supplies of fresh fruit and non-co-operation from local growers of citrus fruits. The conditions then obtaining have since changed, both as regards supplies of fruit and the attitude of the growers, and any steps taken to establish a similar business again would have a reasonable chance of success.

In the past there has been little prospect of increased supplies of fruits and vegetables being available after the local needs and the export demand have been supplied, and therefore no particular inducement to entice capital or enterprise has been apparent. There are, however, indications of certain products being available on an increased scale, especially now that growers are devoting more attention to citrus and fruit culture generally in preference to the less remunerative cereal production, and as adequate irrigation water supplies are being discovered. The production of deciduous fruits in the hill villages is also rapidly extending, and the better varieties of most fruits are in more general cultivation.

The following statement gives a list of the various products, approximate quantities produced, and the period the product is on the market, which could be utilised in a canning and preserving factory:

Kind of Product.	*Estimated Production.*	*Period when Produce is Marketed.*
Citrus:		
Oranges ..	27,000,000 Nos.	November-May
Lemons ..	13,000,000 ,,	August-June
Mandarines	4,000,000 ,,	November-January
Figs	3,000,000 okes*	August-December
Grapes	50,000,000 ,,	July-November
Cherries ..	170,000 ,,	May-July
Apples	220,000 ,,	August-November
Apricots	1,150,000 ,,	May-July
Peaches	160,000 ,,	August-September
Pears	160,000 ,,	August-November
Plums	340,000 ,,	July-August
Quinces	90,000 ,,	September-October
Melons	3,000,000 ,,	June-August
Pomegranates ..	5,000,000 ,,	August-November
Tomatoes ..	2,000,000 ,,	April-November
Cauliflowers ..	300,000 ,,	November-March
Cucumbers ..	2,500,000 ,,	April-November
Onions	2,500,000 ,,	May-August
Beans	400,000 ,,	March-December
Broad beans ..	3,000,000 ,,	December-May
Haricot beans ..	3,000,000 ,,	March-December

* 1 oke = 2¾ lbs.

From the above statement it will be observed that once a business is started with one of the more important of the island's products there are sufficient other products with which operations could be tried and which, if successful, would keep the factory in employment throughout the year. Citrus fruits are available from November to May. In the spring the stone fruits appear. Cherries and apricots are first on the market in late spring, followed by plums and peaches in summer and apples, pears, and quinces later in the year. In addition, figs and grapes are available throughout the late summer and autumn.

Owing to the limited quantities produced of most of the above products and the unsuitability of some of the products above referred to for preserving or canning there is not sufficient material to establish a large-scale business at the outset, but production would doubtless expand once there was an assured market.

The following notes on some of the products referred to will serve to indicate the present position and future prospects of the various commodities under consideration:

Citrus.—In Cyprus, citrus production is one which offers the most immediate prospects of rapid development. This is especially the case with oranges and grapefruit. The rate at which new orange groves are being planted and the recent interest in grapefruit planting will in a very short period make citrus one of the island's leading industries. The oranges produced are of the Jaffa type, but a certain quantity of Valencia and Seville bitter oranges are also grown. Lemons, which are favourably reported upon for juice extraction, are fairly extensively grown, and the thick-skinned type of lemon suitable for manufacture into candied peel is produced in a very limited extent. Mandarines appear early in the season, and limes have recently been introduced. Grapefruit production, which is in the initial stage, is likely to become in time a valuable citrus product.

The above products offer possibilities for the extraction of citrus fruit juices, manufacture of Cyprus marmalade, canning of grapefruit, and preparation of candied peel, besides other citrus by-products.

Figs.—In view of the climatic and other natural advantages for successful fig production, Cyprus is in a favourable position to compete with other Mediterranean countries in supplying the United Kingdom demand for figs. Present production, although fairly abundant, is far too scattered for economic efficiency in improving the crop and in the marketing of it, but in areas where the industry has been localised with a view to the production of a uniform brand a small business in the packing of dried figs for export has been built up. The success of this business has been an incentive to other localities to consider what action should be taken to participate in the drying and packing of figs for export. With improved standardisation in production the canning of green figs in syrup in the island offers excellent possibilities.

Grapes and Raisins.—The grape and wine industry ranks as one of the leading industries in the island, and vineyards cover

Nicosia, Cyprus.

(*Both this and the illustration of historic Famagusta on the opposite page are reproduced by courtesy of the P. and O. Steam Navigation Company.*)

a total area of over 92,000 acres. There is an increasing demand for grapes for wine making, for export as fresh grapes, and for raisin making. New varieties of vines for table grapes and for wine making have been introduced by the Department of Agriculture and are propagated at the Saittá Experimental Vineyard, and rooted cuttings are freely distributed to vine growers. The Cyprus raisins now produced are more suitable for ordinary commercial than for confectionery purposes, but better quality raisins will be available when the new varieties of vines become more generally distributed. The quality of sultanas is very favourably reported upon.

Cherries.—Production is not sufficient for canning on a commercial scale, and the fresh fruit at present grown is readily sold in Egypt and Palestine. New areas are being planted every year, and production on an increased scale may be expected within the next few years.

Apricots.—Apricots, as well as kaishas—a type of white apricot peculiar to Cyprus—peaches, and pears, are produced in limited quantities, and they are of poor quality for canning, but large numbers of imported varieties are being distributed to growers, and the desired quality and increased quantities of these fruits are likely to be produced in the future.

Pomegranates.—The production and marketing of pomegranates ranked as an important item in the island's trade a few years ago. Exports of the fresh fruit were limited to Egypt, and before the prohibitive tariffs imposed by the Egyptian Government on pomegranates and other fresh fruits the value of the export trade amounted to over £20,000 annually. Exports of the fresh fruit have dwindled considerably, and the pomegranate trees are gradually being replaced by citrus. There are possible outlets for pomegranate juice as an ingredient in fruit beverages.

Tomatoes.—There are possibilities of developing an export trade in tomato pulp or in the production of tomato products in the form of sauce, soups, juice, etc., provided tomatoes were produced on a sufficiently large scale to justify the establishment of the necessary plant. The tomato is successfully grown in Cyprus and the yield is prolific. It is now grown for local consumption only. When there is a surplus over and above local requirements, and when prices are low, growers prepare a tomato paste (pulp), to be used at times when fresh tomatoes are not available locally. The quantity produced, however, is not sufficient for local requirements, and further supplies are imported annually from Syria and elsewhere.

Other products of Cyprus of interest and importance to the food industries are nuts, olive oil, mosfilo jelly, honey, and Turkish delight.

Almonds.—The growing of almond trees receives a fair amount of attention in Cyprus, as nearly every landlord, especially in the hill districts, owns a few trees, but owing to production being confined to peasant farmers who at the most only own a few trees, the production of nuts and the quantities exported have not assumed very great importance. The quantity exported in 1932 was 2,336 cwt., valued at £10,418. Owing to the interest recently taken in Cyprus as a source of Empire almonds, more attention is being given to this product and larger areas are being planted up. There are several good commercial types grown in the island, and with systematic cultivation and proper attention more uniform samples will be produced. Walnuts and hazelnuts are also grown.

Olive Oil.—The output of olive oil is insufficient to meet local requirements, yet there is a certain quantity of olive oil exported every year. Local requirements are met by imports from the Greek islands, for which oil there is a local preference. Every encouragement is being given to increase production and to induce growers to devote more attention to their existing trees and to the methods of gathering the fruit. It is desirable that local requirements are supplied by the island, but any increased production, if not absorbed locally, should find an outlet in the export trade, as Cyprus is one of the few Empire sources of olive oil.

Mosfilo jelly, made from the fruits of wild hawthorn, Cyprus honey, and Turkish delight, are food products which arouse interest and merit attention.

Meat.—Animal husbandry forms an integral part of the rural life of Cyprus. Surplus animals are sold by the peasant farmer for the local market or for export. An export trade in live animals is well established with the neighbouring countries of Palestine, Egypt, and Greece. It is therefore to the development of this trade in live animals rather than in the production and export of animal products that future development is likely to take place. Furthermore, the production of animal products of value and interest to the food industry is more likely to find a ready sale locally and in nearby markets rather than in export to the United Kingdom, owing to climatic and other natural and local conditions. There is a local bias in favour of sheep and goat dairying. Dairy cows, except in the neighbourhood of large towns, are not kept. Dairy products are therefore from the sheep and the goat, and cheese, which is produced in quantity from sheep or goat milk, is exported to Egypt.

A market gardening scene at Kythrea.

Milky Wastes

The problem of the satisfactory disposal of milky wastes from dairies and other factories, already a serious one, will become much more so if the present reorganisation and marketing schemes for the milk industries develop into a permanent institution.

Dr. Norman outlines the difficulties involved and writes from actual experience, as he is associated with the research work being carried out at the Rothamsted Experimental Station.

By A. G. Norman, D.Sc., F.I.C.,
Rothamsted Experimental Station

Milch Cows in Queensland.
(Courtesy of the Agent-General for Queensland.)

OF RECENT years there has been in this country a large increase in the number and size of milk collecting and distributing depôts, and in factories dealing with dairy products. The disposal of the waste waters from these plants has given a great deal of trouble, and it cannot yet be said that the problem approaches solution. Many of the factories and depôts have been erected in the hearts of rural districts, away from any large centres, and often in small villages with a rudimentary sewage purification plant or none at all. In the latter case they are probably to be found on the banks of some small and previously delightful stream, now becoming seriously damaged as the result of the polluting effluents discharged into it. Even if a sewage purification plant is available and the dairy effluent be treated with the domestic sewage, difficulties are likely to arise unless the proportion of crude sewage to dairy waste is high.

The purification of dairy effluents is very far from a simple matter, and there are several confusing issues. In the first place, the composition of the waste water to be treated is very variable from factory to factory, and from time to time in any given factory according to the processes which are going on. From collecting and distributing depôts the waste will consist largely of the washings from churns and cans, and will therefore approximate to very dilute whole milk. In a dairy products factory the waste will entirely depend on the particular operation being carried out and on the practice of the factory. Frequently it is customary to require the farmer to take back an equivalent or proportionate amount of whey or buttermilk. This he may not wish to do if he has insufficient animals to feed it to, and, further, from a sanitary point of view, it may not be desirable, inasmuch as the farmer's facilities for resterilising the cans are not often very satisfactory. The upshot is that the factory may find itself with considerable quantities of whey or buttermilk for which it has no use and can find no outlet, and which it has to put down its drains. As a result of the pollution caused, it may come into conflict with adjacent landowners, local authorities, or rivers boards. There have been cases in which the factory has been compelled to close down through its inability to purify its effluents at a reasonable cost.

Milk has three groups of organic constituents—fat, about 3·5 per cent., protein (casein), about 3·5 per cent., and milk sugar (lactose), about 5 per cent. If butter is being made the fat will largely be removed, and the resulting buttermilk will consist of lactose and protein together with a little fat. A creamery may take practically all the fat, leaving a skim milk of sugar and protein. In cheese making, on the other hand, protein and fat are largely removed, and the whey remaining contains mainly sugar with a little protein and fat. This may be indicated diagrammatically so:

Milk.	*Buttermilk.*	*Skim-milk.*	*Whey.*
L	L	L	L
P	P	P	p
F	f		f

L = Lactose. F = Fat. P = Protein.

The Problem

Since there is in each of these, excepting perhaps whey, both carbohydrate and protein in something like equivalent amount, it might be thought that their disposal by biological means would be simple. If domestic sewage, which is predominantly nitrogenous, can be so dealt with, if beet sugar effluent, pre-

Receiving the Milk at a Modern Dairy.

(By courtesy of the Sparkford Vale Dairy Co-operative Society, Limited, Somerset.)

dominantly carbohydrate in nature, can be similarly treated, why then should it not be easy thus to purify milky effluents?

There are two main reasons, both of them potent ones. First there is the presence of fat, and, secondly, the fact that the carbohydrate in milk is lactose, and lactose is a sugar with rather peculiar fermentative reactions. It has also to be borne in mind that the concentration of organic matter in dairy wastes is usually distinctly higher than in domestic sewage, and furthermore the flow of waste may be very irregular both during the day and the year. Daily irregularities may not be serious, but the seasonal variations may be very great. In the summertime, for example, there may be a surplus of milk and certainly a surplus of whey or buttermilk to be disposed of. However, it is composition rather than quantity which is the chief cause of difficulty.

Fats

Fats as such cannot be oxidised on percolating filters of the ordinary type because they are decomposed only very slowly, and any attempt to run a fatty liquid through a filter will inevitably result in clogging owing to the accumulation of fat in the top layers. It has been shown, for example, that if butter fat is added to soil and left to decompose under aerobic conditions, only about 20 per cent. will disappear in a period as long as a year. From time to time fats do give trouble in sewage purification plants, yet the actual quantity of fat in ordinary crude sewage is vastly lower than that of milk wastes. Moreover, it is usually not dispersed in such a fine condition or stabilised by the presence of casein as in milk. On the other hand, soaps—that is to say, the alkali salt of the high fatty acids—are decomposable on filters, and it must therefore be the initial stage of the removal of glycerol and liberation of the fatty acids that can only be effected by a few organisms. However, the initial breakdown of fats can be accomplished apparently more readily by anaerobic organisms, and it is possible that an anaerobic method might be devised for dealing with effluents containing much fat. The rate of decomposition would probably not be very great even so, and whether such a process could ever be worked commercially is a matter of grave doubt. To some extent the fat can be separated out by treatment in a septic tank for a short period. The protein which stabilises the fat in small globules is in part attacked and digested by micro-organisms, and in part precipitated by the acidic conditions which develop in the tank. This flocculation may carry with it into the sludge a portion of the fat, and more still may agglomerate and rise as a scum to the top. Whether or not much digestion of the sludge will take place depends on the length of time for which the liquid is allowed to remain in the septic tank. To sum up, it might be said that in the treatment of milk wastes the removal and oxidation of the fat is a problem not yet satisfactorily solved.

Lactose

The carbohydrate of milk is lactose, and this fact, too, makes the treatment of such wastes more difficult than might appear. Lactose is biologically far less available than sucrose; that is to say, the number of types of organisms which will ferment lactose actively is far less than those which will utilise sucrose. Moreover, many of the lactose decomposing organisms, and particularly those which occur naturally in milk, are anaerobic forms which produce considerable quantities of lactic acid. If milk or milk wastes are just allowed to stand in a bottle for a few days the pH will be found to be well over on the acid side, due to the production of lactic acid by these organisms. The pH may be about 5·5 to 5·0 or even lower. The result of the production of such a degree of acidity within the fermenting liquid is that the range of organisms which can operate is again enormously reduced. The acidity may even increase to such a point that biological processes are practically inhibited. It has been stated that in the absence of oxygen, inhibiting conditions are likely to develop if the concentration of lactose in the waste approaches 0·05 per cent. In the case of whey, for example, a dilution of 1 to 100 would still contain an amount of lactose of the order mentioned. This production of lactic acid goes on rapidly under the anaerobic or partially anaerobic conditions of septic tank treatment, and the acidity produced may seriously check or inhibit the protein decomposing organisms before the fermentation of the carbohydrate is seriously

interfered with. The second major problem in the disposal of milk wastes is therefore to decompose the lactose without the production of acidic conditions that may check fermentation.

Treatment

There is no agreement as to the best methods to adopt to overcome these two potent difficulties—the refractory and clogging nature of fat and the acid producing effect of lactose; and, indeed, it seems probable that different methods may be necessary for different types of milk wastes. In the case of whey, for example, it is the second difficulty that is the dominant one, since the fat content is low. With churn washings or buttermilk, on the other hand, the presence of fat will be the deciding factor in its treatment. Some form of septic tank treatment is probably essential as much for the separation of the fat as for any direct putrefactive process on the protein, though that, of course, may be important. The initial dilution of the waste, and hence the concentration of lactose present, may determine the length of time for which the septic tank treatment may be advantageously continued. If the lactose concentration is high it must be only brief or else an inhibiting degree of acidity may be set up. If low, then the waste may be held for a longer period and complete conversion of lactose to lactic acid achieved, together with a considerable loss of organic matter.

Lactose solutions and whey can be treated satisfactorily on percolating filters of the usual type; and because, under thoroughly *aerobic* conditions, the lactose fermentation is not accompanied by the production of lactic acid in any amount, higher concentrations can be dealt with in this way. A combination of septic tank treatment followed by percolating filters should give satisfactory purification of a milk waste, provided that in the septic tank there *is* a sufficient removal of fat and protein so that the filters are not clogged and that there *is not* a production of highly acidic conditions.

American Methods

In America a highly ingenious alternative has been proposed whereby percolating filter treatment precedes septic tank digestion. This is made possible by the use of a percolating filter of an unconventional type which will not clog with fat. The filter is built up of layers of ordinary builders' laths laid in a lattice, each layer being at right angles to the previous one. Very satisfactory partial purification is effected by running the waste over such a filter at a rapid rate. Under the thoroughly aerobic condition which obtains, lactose is rapidly fermented away without any accumulation of lactic acid. The object is not necessarily to remove all the lactose, but merely so to lower the concentration that in the subsequent septic tank treatment inhibiting acidities are not produced. Alternatively, the effluent from the lath filters may be treated by the ordinary domestic sewage purification plant without risk of upsetting that process. As far as is known no large-scale plant has been operated on this principle.

Conclusion

Enough has been said to outline the difficulties of purifying milky wastes and the reasons underlying those difficulties. It is a problem which must be faced boldly by the industry, for if the present reorganisation and marketing schemes are successful, the consumption of milk may increase very considerably, and consequently the number of depôts and dairies too. Above all, in planning any new plant the nature and fate of the effluents should be very fully considered, and discharge direct in a stream should not be regarded as the only possible method of disposal.

Washing and Sterilising the Churns.

(By courtesy of the Sparkford Vale Dairy Co-operative Society, Ltd.)

Food Preservatives

Draft proposals for regulating the sale and use of preservatives in foodstuffs were published in 1932 by the German Government, and are expected shortly to become law. We reproduce below some of their essential features.

in Germany

Definition of Preservatives

WITHIN THE terms of the regulations, preservatives are defined as chemical substances which serve during the extraction, preparation, or storage of foodstuffs as destroyers or inhibitors of the development of micro-organisms and thus retard or delay the deterioration of the foodstuffs and prolong their palatability.

This definition, it is important to note, does not call for actual destruction of the micro-organisms.

Only those substances set out in the list below are permissible, and then only in conjunction with the particular groups of foodstuffs specified.

The preservatives must be pure and free from substances deleterious to the health and also free from unfamiliar odours or tastes; in so far as they are included in the German Pharmacopœia they must comply with the standards therein established.

When prepared foodstuffs are in their turn employed in the manufacture of other food products, the final product must contain—unless other standards are mentioned in the complete list—not more than the maximum quantity of preservative permissible in the initially preserved food.

When preserved foodstuffs are sold in packages, these should bear a conspicuously printed declaration. It will generally suffice to use the phrase "chemically preserved," but the addition of boric acid must be clearly expressed in the phrase "preserved with boric acid."

Misleading description is held to be made if a foodstuff treated with preservative is labelled "pure" or "pure natural product" or with some corresponding designation.

Trade in Preservatives and their Description

It is prohibited to offer, stock, or sell or otherwise bring into commerce:

1. Mixtures of preservatives (including those in the form of solutions) with the exception of those mixtures appearing in the official list.

2. Preservatives in admixture with other substances, with the exception of mixtures with table salt, sugar, tartaric acid, citric acid, and mixtures of the ethyl and propyl esters of *para*-hydroxybenzoic acid with sodium carbonate.

As a general guide to deciding whether a particular substance should be admitted to the list of food preservatives, the State Health Council made the following recommendations:

1. A preservative should only be permitted in the food industries after evidence has been forthcoming that it is necessary on health, technical, or economic grounds in conjunction with a specified foodstuff.

2. Foodstuffs bought on the implied understanding that they are in the "fresh" condition, including milk and fresh meat, should not contain any addition of preservative.

3. In general, a preservative is only admissible after proof has been forthcoming that the treated food does not acquire an appearance calculated to deceive the consumer as to its actual condition.

4. Prior to approval of a new preservative, the applicant must bring evidence of its indisputable freedom from injury to health.

5. The common preservatives—such as common salt, cooking fats and oils, sugars, and acetic acid—are to be exempt from the ordinances of the preservatives decree.

List of Approved Food Preservatives

Foodstuff.	*Preservative.*	*Maximum Permissible Weight of Preservative in 100 gm. of Foodstuff.*
1.		
Fish and Crustacean Products: "Kaltmarinaden"	Ethyl and propyl esters of *para*-hydroxybenzoic acid; including their sodium compounds and their mixtures (esters)*	50 mg.
	and	
	hexamethylenetetramine	25 ,,
	or	
	mixtures of esters and hexamethylenetetramine	75 ,,

* The term "esters" is used in the remainder of the list to signify the ethyl and propyl esters of *para*-hydroxybenzoic acid as well as their sodium compounds and their mixtures with one another.

Foodstuff.	Preservative.	Maximum Permissible Weight of Preservative in 100 gm. of Foodstuff.
"Bratmarinaden" ...	Esters	50 mg.
"Kochmarinaden" (in jelly)	Esters	50 ,,
	and	
	hydrogen peroxide solution in the jelly (30 per cent. by weight)	200 ,,
Salmon	Esters	25 ,,
	or	
	Mixtures of benzoic acid and *para*-chlorbenzoic acid; also their sodium salts	50 ,,
Salmon substitute ...	(Same as for salmon) ...	
"Appetitsild," Anchovies, "Gabelbissen"	Boric acid	500 ,,
	or	
	Benzoic acid	500 ,,
Crabs' Tails and Crabs' Claws	Hexamethylenetetramine	50 ,,
	or	
	Benzoic acid	500 ,,
2.		
Fish Roes: German Fish Roe-Caviare	Hexamethylenetetramine	100 ,,
Caviare	Hexamethylenetetramine	100 ,,
	or	
	Boric acid	500 ,,
3.		
Crabs: Tinned Crabs ...	Boric acid	900 ,,
4.		
Preserved Eggs: Liquid Egg Yolk	Benzoic acid	1,000 ,,
	or	
	Sodium benzoate	1,200 ,,
	or	
	Esters	800 ,,
Liquid Egg Yolk exclusively intended for use in fancy bakeries and egg-paste goods factories, but not in the production of dietetic foods	Boric acid	1,500 ,,
5.		
Margarine	Benzoic acid	200 ,,
	or	
	Sodium benzoate	240 ,,
	or	
	Esters	80 ,,
6.		
Preserved Vegetables: Pickling Liquor for Cucumbers and Red Beet	Benzoic acid	200 ,,
	or	
	Sodium benzoate	240 ,,
	or	
	Esters	80 ,,
Horseradish Preparations	Sulphurous acid (SO_2) ...	75 ,,
	or	
	Sodium bisulphite ...	125 ,,
7.		
Groats ("Graupen") and Pearl Barley	Sulphurous acid (SO_2) ...	45 ,,

Foodstuff.	Preservative.	Maximum Permissible Weight of Preservative in 100 gm. of Foodstuff.
8.		
Fruit Preparations: Fruit Juices (mother juices) intended for further manufacture, excepting all types of cherry juices, orange and lemon juice	Sodium benzoate	180 mg.
	or	
	Formic acid (25 per cent. solution)	1,000 ,,
	or	
	Sulphurous acid (SO_2) ...	125 ,,
	or	
	Potassium pyrosulphite ...	435 ,,
	or	
	Esters	90 ,,
Cherry Juices in all forms. Orange Juice. Lemon Juice	Sodium benzoate	180 ,,
	or	
	Formic acid (25 per cent. solution)	1,600 ,,
	or	
	Sulphurous acid (SO_2) ...	125 ,,
	or	
	Potassium pyrosulphite ...	435 ,,
	or	
	Esters	90 ,,
Fruit Pulp and Fruit Butters ("Obstmark")	Benzoic acid	150 ,,
	or	
	Sodium benzoate	180 ,,
	or	
	Formic acid (25 per cent. solution)	1,000 ,,
	or	
	Sulphurous acid (SO_2) ...	125 ,,
	or	
	Potassium pyrosulphite ...	435 ,,
	or	
	Esters	90 ,,
Fruit Jams ("Obstkonfitüren"), Marmalades, Plum Compote ("Pflaumenmus")	Benzoic acid, sodium benzoate, formic acid, esters, in aqueous or alcoholic solution for wetting parchment paper used as covering for the surface of the product packed for sale	
Fruit Juice used directly as a beverage, excepting grape juice	Sulphurous acid (SO_2) ...	12·5 ,,
	or	
	Potassium pyrosulphite ...	45 ,,
Dried Fruit	Sulphurous acid (SO_2) ...	200 ,,
9.		
Liquid Fruit Pectin. Fruit Setting Juices	Sodium benzoate	180 ,,
	or	
	Formic acid (25 per cent. solution)	1,000 ,,
	or	
	Sulphurous acid (SO_2) ...	125 ,,

Foodstuff.	*Preservative.*	*Maximum Permissible Weight of Preservative in 100 gm. of Foodstuff.*
	or	
	Potassium pyrosulphite ...	435 mg.
	or	
	Esters	90 ,,
10.		
Soft Drinks ("Obst" lemonades and "Frucht" effervescent fruit beverages)	Sodium benzoate	50 ,,
	Esters	50 ,,
11.		
Confectionery and Chocolates: Marzipan, Marzipan Substitute, Cream Fillings, Fruit Fillings, Fat-containing Fillings, also for waffles and similar bakery goods. Fat-free Glazings, Liquid Fondant Masses, Macaroon Mass	Benzoic acid	150 ,,
	or	
	Esters	120 ,,
12.		
Ices	Benzoic acid	100 mg.
	or	
	Esters	15 ,,
13.		
Edible Gelatine	Sulphurous acid (SO_2) ...	125 ,,
14.		
Edible Mustard	Benzoic acid	150 ,,
15.		
Liquid and semi-liquid Coffee Extracts and Coffee Substitute Extracts	Esters	100 ,,
16.		
Malt Extract with a water content of 20 to 25 per cent. and in packages of 5 kilograms and over	Esters	50 ,,

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At the B.I.F.

By the time this is published the British Industries Fair will be drawing to a close, and now that one's mind is full to confusion with so many conflicting impressions it would seem a not inopportune moment to set down in print two very common criticisms—*i.e.*, that the duration of the Fair is too short and that its layout, classification, and general arrangement still leave a very great deal to be desired.

We give below a list of some of the principal exhibitors connected with the food industries. A more detailed description of the various exhibits is to be found in *Food Industries Weekly* for February 23 and March 2.

Olympia

A Boake, Roberts and Co., Ltd.: Grand Hall, Stand A.90. Flavouring essences; preservatives, brewing and wine specialities.

W. J. Bush and Co., Ltd.: Grand Hall, Stand A.88. Flavouring essences; food colours; fine chemicals, vanilla, coumarin.

G. A. Harvey and Co., Ltd.: Grand Hall, Stand A.80. Steel office furniture; works equipment; shelving; storage bins.

Imperial Chemical Industries, Ltd.: Grand Hall, Stands A.85a and A.89. Food colours; solvents; alkalis; disinfectants; fertilisers; sterilisers.

Johnson, Matthey and Co., Ltd.: National Hall, Stand D.26. Precious metals, and silver equipment for food processing.

Robinson and Sons, Ltd., Chesterfield: Grand Hall, Stands A.102, A.124. Containers.

Eburite Corrugated Containers, Ltd.: National Hall, Stand G.49. Corrugated fibreboard containers.

Thames Board Mills, Ltd.: National Hall Gallery, Stand G.17. "Fiberite" packing cases; corrugated cartons, packing materials; cardboard.

Thompson and Norris Manufacturing Co.: National Hall Gallery, Stand G.64. "Corrucases" for packing food products and bottled goods of all kinds.

Tintometer, Ltd.: Grand Hall, Stand A.179. Colorimetric apparatus for foodstuffs analysis and matching.

Williams (Hounslow), Ltd.: Grand Hall, Stand A.69. Food colours and dyestuffs for all purposes.

Wingrove and Rogers, Ltd: Empire Hall, Stand H.64, 1st Floor. Electrical equipment for the factory; electric vehicles.

Birmingham

Much of the heavier equipment and machinery is displayed at the Birmingham section, where the following firms exhibit:

Fredk. Braby and Co., Ltd.: Stand D.411. Metal office and factory equipment; storage tanks; stainless plant; building fittings.

J. J. Blow: Stand A.833. Dairy utensils and metal-ware.

British Emulsifiers, Ltd.: Stand A.465. Emulsifying machines.

Bulpitt and Sons, Ltd.: Stand A.641. Aluminium equipment for the food factory.

A. Holden and Sons, Ltd.: Stand A.741. Lacquers for fruit and vegetable canning; varnishes, etc.

George Salter and Co., Ltd.: Stand A.611. Weighing machines.

G. H. Williamson and Sons, Ltd.: Stand A.723. Can makers; metal containers.

Gledhill Brook Time Recorders, Ltd.: Stand B.831.

G. A. Harvey and Co. (London), Ltd.: Stand B.925. Screening equipment; industrial metal work.

Cambridge Instrument Co., Ltd.: Stand C.311. Scientific instruments, measuring devices.

S. Wolf and Co., Ltd.: Stand E.840. Can-making equipment.

W. T. Avery, Ltd.: Stand F.333. Weighing machines.

E. W. Bliss Co.: Stand F.543. Canning equipment.

Henry Wiggin and Co., Ltd.: Stand F.412. Nickel and monel metals, plant and equipment.

IDEAS FOR CANNERS—SOCIALISM AND SOYA BEANS—GLASS-PACKED CHEESE—FOOD PLANT DEVELOPMENTS—ELECTRIC MINCERS

Ideas for Canners

No less than 259 varieties of food are now being canned in the United States, according to a survey recently completed by the American Housewife's Bureau.

This list comprises 57 different packs of vegetables, 44 packs of fruit, 30 of fish, 33 of meats, 32 of soups, and 63 of miscellaneous varieties.

There are six varieties of canned beans, including a special kosher pack, and included among the unusual vegetables are okra, succolash (a mixture of green maize and beans), hominy, whole wheat, lentils, and rice. Apart from condensed and evaporated cow's milk, the American housewife can also obtain canned buttermilk and goat's milk. Her cider is obtainable in cans.

A wide variety of canned pickles, including spiced fruits, are at her disposal, as are popcorn, fig, and Christmas puddings; pig's trotters and brains. There are seven various forms of canned beef, four of chicken, and five of peaches.

Little-known dishes are also canned. These include Chili Con Carne, chow chow, clam cakes, fiskebolle, whole squab, chop suey, pepper pot soup, and lime Bean purée.

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Cheshire Cheese

The Ministry of Agriculture and Fisheries has just issued Marketing Leaflet No. 48, Cheshire Cheese, in explanation of The Agricultural Produce (Grading and Marketing) (Cheshire Cheese) Regulations, S.R.O., 1933, No. 677.

Directions are given for the grading and marking, for authorisation and for manufacturing requirements, either for farm or factory cheese. The procedure for sampling cheese is also described.

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Socialism and Soya Beans

While the world at large does not know what to do with the glut of food, Russia (states *Food Industries Weekly*) is spending time and money on research and experiments for the production of substitute foodstuffs. Officialdom has pinned its faith on the soya bean—the Mongolian cereal—as the future food of the masses.

Soya bean flour is to replace wheat and to save eggs and butter. The juice of the soya bean will yield milk and cream and cheese; in fact, it is the soya bean that will turn Russia into a land flowing with milk and honey.

It is reported that in one factory alone enough soya milk can be produced to replace 20,000 cows. It has been discovered that a little soya in the soldier's knapsack means many days of food on the march.

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Morris-Commercial Sales

Messrs. Morris-Commercial Cars, Ltd., report that orders for the heavier types of vehicle received during the past three months show an increase of over 50 per cent. as compared with those over the same period last year. The models referred to are in the 4- to 5-ton class. Recent heavy vehicle fleet orders include: Eleven 5-ton "Courier" brewer's lorries for Samuel Allsopp and Sons, Ltd.; twenty-six 4-ton "Courier" hydraulic tipping lorries for Gloucester Council; and seven 5-ton "Courier" vehicles for Edinburgh Corporation, this being a repeat order. An interesting feature of this vehicle is that the power unit can be wheeled out on the front axle for maintenance work.

In addition, the Post Office Stores Department, London, have just placed orders for a further one hundred and thirty Morris-Commercial 15-cwt. and 1-ton vans. We understand that, previous to this, over 2,000 Morris-Commercials have been supplied for Post Office work.

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Success of Glass-Packed Cheese

The accompanying illustration of a cottage cream cheese, packed in special drinking-glass, is a package which has proved a best-seller in America.

The proprietors of the brand declare that since the cheese has been packed in this simple re-usable container sales have increased five-fold. Particularly was this the case in warm weather. British manufacturers, who know the sales-aid given to jams or preserves such as lemon-curd, when packed in re-usable jugs or drinking-glasses, will easily understand that such a novel pack, adapted to cheese, has been a powerful sales-booster.

The cheese is what is known as a low-acid or modified rennet process cheese, made as follows:

1. Skim milk is pasteurised and poured into large cheese vats.

2. Cheese colour, rennet, and lactic starter are added in small amounts—about 2 per cent. starter and approximately 1 cubic centimetre of rennet for each 1,000 lb. of skim milk.

3. The skim milk with starter, rennet and colour added is allowed to set at 68° to 70° F. overnight.

4. Curd is cut with wire curd knives and heated to separate the whey.

5. The whey is drawn off and the curd washed with ice water.

6. The curd is then ready for creaming. Sufficient cream is added to make the creamed cheese approximately 4·5 per cent. butterfat.

This is called "creamed cottage cheese." It has a rich, creamy ap-

pearance and a distinctive curd. The appetite appeal and sales appeal of this product are, of course, enhanced considerably when packed in glass.

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Food Plant Developments

We are informed that a controlling interest in the G.C. Engineering Co., Ltd., has been acquired by Fredk. Braby and Co., Ltd., the old-established firm of metal workers and structural engineers, of 352-364, Euston Road, London, N.W. 1, and Ida Works, Grinstead Road, Deptford, S.E. 8.

The G.C. Engineering Co., Ltd., are well known in certain directions as manufacturers and designers of conveyors and complete canning lines. Mr. R. F. Graham and Mr. S. C. Calladine are being retained on the Board.

Important developments may confidently be expected from the new control, as Fredk. Braby and Co., Ltd., are a large organisation with no less than seven factories in various parts of Great Britain, and are already manufacturers of a comprehensive range of plant for the food industry, including pressure cookers.

Can elevating and conveying machinery will be shown in motion on Braby's stand (No. D.411) at the B.I.F. (Birmingham section).

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Electric Mincers

Several important improvements have recently been made to the Lion electric mincers.

This type of machine is particularly suitable for use in shops so that customers may see that the goods are freshly made under modern and hygienic conditions. The chopper is 100 per cent. safe, and is said to comply with the safety requirements of the Home Office. This means that a boy can operate the machine without danger.

It is possible also to make sausages of any desired texture by using plates with various sized holes. That is to say, a meaty or pasty sausage may be made with equal facility.

Furthermore, on this type of machine no skill is required in the actual making of sausages once the recipe has been arrived at, and every particle of gristle is eliminated. This type of machine is also used for filling out so that in actual practice it is a complete sausage maker.

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New Features

Many brand new and exclusive features are embodied in the chopper head of the new Lion High-Speed Chopper. For instance, the sloping quick-feed chopper body ensures that the meat drops in front of the worm and not at the back, and it goes forward more quickly. The high-speed propelling worm has been scientifically designed not only to carry the meat forward, but also to exercise considerable push which speeds up output.

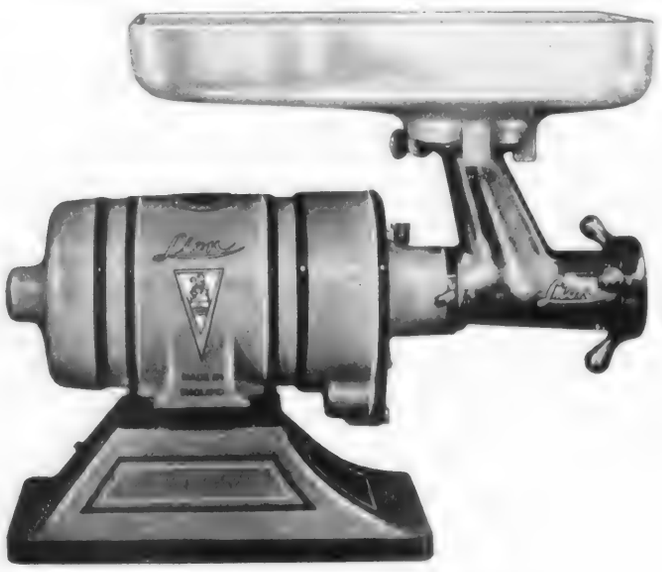
A Hoffman rustless steel ballrace fits on the end of the worm, which takes the full thrust and keeps the chopper perfectly cool, so preventing the meat heating up. This is a very important point in sausage making, because if there is the slightest tendency for the meat to get warm it will quickly sour.

A further feature is the steel-toothed cutting bridge which consists of a row of steel teeth shrunk into the head. All gristle and sinew is clipped before it reaches the knife. This prevents choking back, and saves the wear of the knife and plate.

The tightening ring is made with three knobs, so that it can be easily hand tightened or loosened. This is a considerable advance over the old method of tightening the ring with a chopper or cleaver.

A white porcelain enamelled iron feed tray of extra large capacity fits over the chopper head, and is easy to remove and keep clean. This tray holds a good quantity of mixture, and obviates excessive handling.

Besides being a sausage making machine, the Lion Mincer is also used for mincing meat, cutting pie meat, breaking down fat for dripping, and shredding suet.



The Lion Electric Mincer (reviewed above).

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Change of Address

A new office and factory are being made ready for Eburite Corrugated Containers, Ltd., at 29-31, Oswald Street, Glasgow, the telephone number being Central 2070.

These premises are being opened on the 5th of this month, and all Scottish business will in future be transacted through them.

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Mr. T. McLachlan

Readers will have learned with regret of the death of Mr. William Partridge, F.I.C., public analyst to the Metropolitan Borough of Fulham and the County Borough of Burton-on-Trent and joint public analyst to the County of Dorset and the County Boroughs of Poole and Penzance. Since that date the practice has been carried on by Miss Mathews, B.Sc., his chief assistant, under the general supervision of Mr. Hawkins, F.I.C., of Canterbury.

At the suggestion of Mr. Hawkins and the request of Mrs. Partridge, Mr. T. McLachlan, A.C.G.F.C., F.I.C., a well-known analyst and frequent contributor to FOOD MANUFACTURE, has now taken over Mr. Partridge's practice and laboratory, having already engaged the whole of his staff. Mr. McLachlan intends to ensure the continuation of Mr. Partridge's methods of work and to give the same personal attention to the interests of his clients as did Mr. Partridge.

INFORMATION and ADVICE

Cocoa Butter Press—Onion Pickling—Prepared Mustard—Table Jellies—Glacéing of Fruit—Baked Beans in Tomato Sauce—Scum in Pickles—Piping Jelly—Blowing of Jam—Fruit Pulp—Chutney Spoilage—Knackebrod—Paté de Foie Gras—Mayonnaise—Rancidity—Soup—Asparagus

Cocoa Butter Press

1,530. *We should appreciate receiving any information you can give us to hand on to an enquirer regarding the method of separating cocoa butter from the nibs by extrusion presses of the horizontal type. Is it necessary to pass the nibs through a triple mill before putting them into the extrusion press?* (England.)

We presume you are referring to the ——— continuous type of horizontal press. It is one of the chief features of this press that the material need not be first brought to a liquid form. The roasted nib, or roasted beans, or even raw beans, may be fed continuously into the machine, and a constant outflow of cocoa butter obtained. It is claimed that the output is greater than from the usual type of vertical press. On the other hand, attention should be given to the following possibilities:

1. The heat effects may be greater than with the hydraulic press.

2. If uncrushed beans are fed into the machine, the shell-butter is liable to be softer and of lower melting point than the ordinary product.

3. There seems to be a possibility of cocoa matter getting into the butter.

4. The resulting extracted residue may be very hard and make grinding difficult.

No doubt a machine of the horizontal type could be designed to avoid these possibilities. Or has this already been done?

Onion Pickling

1,531. *We are startling pickling, using Dutch onions and vegetables imported in brine. Kindly supply directions for pickling.* (London.)

The following is a summary of particulars supplied:

Run off the brine from the cask of onions. Fill up the cask with water at 160° F.—not higher. Stand for a certain period.

Run off the water and repeat this washing twice again. Now fill the cask with a 4½ per cent. of acetic acid and water. Allow them to stand for forty-eight hours or more before using. They will keep for some time in this solution.

Large onions may be cut up for mixed pickles or piccalilli for packing in quart, half-gallon, and gallon jars.

Size No. 1 are filled into 10-oz. jars. Size No. 2 are filled into 20-oz. and quart jars. Size No. 3 are filled into half-gallon and gallon jars.

When packed in glass, a finger chillie is introduced into each container against the side. The containers are filled with malt vinegar of correct strength. Then they are inverted over a draining table and allowed to drain overnight.

Next day they are filled with a vinegar of correct strength, adding a few black peppers, pimentoes, and small chillies.

It is important to cap as soon as possible after filling, to keep out the air.

Prepared Mustard

1,532. *We wish to manufacture a prepared mustard, but have had no previous experience of manufacture. We are submitting you a sample of the product we desire to imitate.* (London.)

The only satisfactory way, and the one which pays in the long run, is to call in a food chemist or someone with previous experience to make up a product to match the sample which you have sent us.

The wet type of mustard usually contains ground mustard seed, yellow corn meal, salt, vinegar, turmeric, and some flavouring agent such as Worcestershire sauce, mushroom powder, or port wine.

Table Jellies

1,533. *Could you please supply information on the manufacture of table jelly tablets?* (London.)

We think the best thing we can do in this matter is to refer you to the information which we have given in the *Food Industries Manual* on the subject. You will find all the information on page 80 of the 1933 edition, and this should give you all the particulars you require.

If after perusing this you are not clear on one or two points, please let us know, and we will do what we can to help you.

Glacéing of Fruit

1,534. *We would appreciate any information and references to the literature on the commercial methods for the candying and glacéing of fruits and fruit peels that you can give us. We are particularly interested in this information as applicable to the treatment of citrus fruit peels, cherries, and figs.* (U.S.A.)

This is a big subject, as you will appreciate, and it is practically impossible to give any really useful information in the course of a letter. The best thing we can do is to refer you to the following articles which have been published in FOOD MANUFACTURE: "Preparation of Candied Peel," August, 1932; "Glacé Cherries," November and December, 1933, and January, 1934; "Glacé Cherries," p. 359, October, 1933; "Preparing Glacé Cherries," September, 1932.

If after you have consulted these articles there are any further points, we shall be only too pleased to do what we can to help you.

Baked Beans in Tomato Sauce

1,535. *Kindly supply directions for packing baked beans in tomato sauce.* (England.)

We are quoting the following information from the *Food Industries Manual* in case you have not a copy. A note on the subject also appeared in the March, 1932, issue.

The canning of this product, with or without the addition of pork, is useful as a winter pack, but must be carried out on a large scale if it is to prove economic. The drawback of the raw material is that it is not of British origin. A class of bean largely used in America is the Canadian pea bean, but supplies are not available in this country. The Japanese beans, known as Ohtenashi and Kotenashi, and the Danubian bean, are the principal varieties in use. The Rangoon bean is seldom used. The beans are soaked, then either blanched or oven baked and filled into the cans. The tomato sauce flavoured with spices as desired, and containing $\frac{1}{4}$ to $\frac{1}{2}$ per cent. of starch if required, is added hot. The cans are then seamed and placed in the retorts. As the pack is solid and starchy, the sterilisation time is about twice that used for most other vegetable packs.

Scum in Pickles

1,536. *Could you give me information on the brining of onions? Also advise me if it is possible to overcome the difficulty of discoloration and a slight scum which appears in the jars after the onions have been packed a few days.* (Lancashire.)

Directions were given for the brining of onions, pointing out that the practice varies according to the kind of onion being brined.

Advice was given concerning the second part of the question.

Piping Jelly

1,537. *We are subscribers to* FOOD MANUFACTURE, and *we wish to say that this particular publication has proven most helpful to us on a number of occasions, and we are wondering if you can be of some further assistance to us. We would appreciate if you could give us an approximate formula for a piping jelly made without fruit purée or pectin. Any information which you can furnish to us will be appreciated.* (U.S.A.)

We have given recipes for piping jelly in our May, 1931, and February, 1932, issues, and probably you have these in your possession. If you have not, we have one or two copies of the May, 1931, issue, but the other is out of print.

It should be noted that purée may be substituted by the same amounts of glucose, and it is also possible to make a piping jelly with agar, using glucose in place of both purée and sugar.

The glucose is placed in a pan and boiled to 220° F. Add the same amount of glucose as you would purée, together with a little tartaric acid. Of course, you can make it from fruit by using 40 lb. fruit, 30 lb. sugar, 40 lb. water, together with flavour and colour.

Blowing of Jam

1,538. *We shall be pleased if you can answer the following questions:*

1. *If in the filling of new season's fresh fruit strawberry jam the jars are firstly half filled and then filled up after a period of two minutes or so, can this cause the jam to "blow" within four or five weeks' time?*

2. *Can unripe strawberries cause the jam to "blow"?* (London.)

In answer to your enquiry about the "blowing" of strawberry jams, a possible cause of this is the use of wet jars, filling jugs, or filling pans, but a much more common cause is to be put down to the cooking of the fruit; that is to say, if the boiling is rushed so that the fruit has not been properly cooked throughout, then it is very likely that the difficulty you mention will arise.

It is a good practice to arrange for three boils from each pan during the hour. What it simply means is that insufficient time is given for the sugar syrup to penetrate uniformly through the strawberries, thus leaving the core of the fruit, which is consequently subjected to spoilage by micro-organisms, owing to the low concentration of sugar.

Fruit Pulp

1,539. *Kindly supply information on the preparation of fruit pulp packed in bulk.* (London.)

We would first of all suggest that you refer to the article which appeared in the July, 1933, issue of FOOD MANUFACTURE, entitled "Preservation of Fruit Pulp." In the January, 1934, issue there was a paragraph dealing with the canning of apricot pulp, and this might also be of assistance to you.

If the information given does not meet your requirements, perhaps you will communicate with us again, and we will endeavour to supply further information for you.

Chutney Spoilage

1,540. *We are manufacturers of one or two lines of sauce, and we recently tried a mixing of green tomato chutney containing fresh green tomatoes, onions, and apple pulp. This is boiled up with spiced malt vinegar, and contains the usual peppers and spices, with glucose for thickening purposes. After bottling some of the chutney, we found it fermenting, and we were advised to mix in benzoic acid in the proportion of ¼ oz. to 50 gal. of the chutney. This was done, but we find the chutney still fermenting. Please tell us how to stop this fermentation. The remainder of the unbottled chutney is still lying in wooden vats.*

Please give us full instructions on the pickling and bottling of onions, cauliflowers, and gherkins. (England.)

As regards the pickling of onions, etc., some instructions were given. They can only be general because the actual details of the process depend on the nature of the raw materials and the type of product it is desired to produce. For example, in the case of onions, the procedure will differ for English, Dutch, Egyptian, and Silverskin onions. There are many ways of putting up cauliflowers, according to the type and grade of product desired.

The first question is one to which, of course, we cannot give a satisfactory reply because obviously the source of the trouble may arise from a variety of reasons.

What is clear, however, is that you are getting infection somewhere. It may be from your tomatoes, apples, and the vessels and equipment which you use in the manufacturing process.

The first essential is to see that all your materials are perfectly clean and free from bad parts which are likely to carry yeasts, and to see that all your utensils are thoroughly sterilised with boiling water and steam, preferably also with the use of sodium hypochlorite.

If you do this we cannot see that there should be any risk of fermentation—that is, of course, assuming that your formula is quite alright and that you have sufficient acetic acid and spices, which assist in preserving the chutney. If you fill into your bottles at over 180° F. and cap immediately, and also see that your caps are perfectly sterilised before filling, everything should be in order.

We are rather surprised that you use glucose as a thickener. The general practice is to use gum tragacanth. For this purpose you soak 1 lb. of gum tragacanth in a gallon of malt vinegar overnight, and next day stir it well and add another gallon of vinegar. Then again stir well.

Why don't you use canned tomatoes? There is a risk in using fresh tomatoes on account of the danger of infection. You could also use 80 per cent. acetic acid—say, a total of 24 oz. to 70 lb. tomatoes, 25 lb. onions, 28 lb. sugar, 5 lb. salt, 1 lb. gum tragacanth, and 4 gal. water.

In the case of your apples, we are not clear what you use there. Do you prepare your own apple pulp, or is it apple pulp which has been preserved properly with SO_2?

There is a great danger of fermentation arising from apple pulp which has not been properly prepared. You will find fermentation occurring in mincemeat if raw apples are used and the proper precautions are not taken. If you put up your own apples it is best to use sour cooking apples preserved in a 5 per cent. solution of SO_2. You have to be very careful about the use of apples, and also, of course, about tomatoes, as they are liable to introduce yeasts which cause fermentation.

Knackebrod

1,541. *Could you give us any idea of the composition and method of preparation of "Knackebrod"?* (France.)

This is a special preparation made by a German firm and is used for incorporation in wheatmeal flours. Its exact composition we do not know, but we believe it contains, among other things, ox blood. It is popularly used in Holland.

Paté de Foie Gras

1,542. *Can you give us a recipe for the preparation of Paté de Foie Gras and also for preparing and processing cocks'-combs in glass?* (England.)

It is impossible for us to give you any degree of satisfaction on a matter of this kind by correspondence.

There are so many points to be taken into consideration, so at the best one can only reply in a general manner.

You will agree that for a job of this sort, which involves the developing of a product, particularly one such as Paté de Foie Gras, it is absolutely essential to have someone with experience on the spot.

As regards cocks'-combs, the general procedure is, after cleaning, to immerse them in a light brine for, say, about twenty-four hours, and then wash them in a solution of vinegar. After that they are cooked in steam and afterwards, when cold, packed in glass containers and passed through the usual sterilising process.

As for Paté de Foie Gras, the procedure in a general way is to cook the livers and pass them through a mincing machine, and then add the hot fat which has been melted out from the fat cut away from the livers. The two are mixed together, and additions of spices, truffles, salt, and so on are made. The whole is then mixed well together and passed through a mincing machine. After filling into tins or glass, the containers are sterilised in the usual way, except that special care has to be exercised during the sterilising process to avoid darkening of the product.

Mayonnaise

1,543. *We should be obliged if you could inform us if fresh egg yolk is to be preferred to the preserved product for emulsifying purposes. What is the best oil to use in order to avoid troubles from separating out of solids?* (Sweden.)

For all practical purposes there is no important difference between egg yolk and preserved eggs with regard to their emulsifying qualities. Of course, actually fresh egg yolk will have greater emulsifying properties than egg yolk which has been preserved—as, for example, by freezing.

It is general practice, both in this country and in

America, to use frozen eggs. If fresh eggs are used they should be used as soon as possible after breaking, and if there is any reason to hold them in storage the room should be kept below 50° F.

As regards oil, this is a matter which depends very largely on the type of oil used. In this country arachis oil is most generally used. We understand there is no trouble from solid matter settling out from this oil at low temperatures. On the other hand, arachis oil is not used to any appreciable extent in the United States. There it is customary to use cotton seed oil and corn oil. At one time corn oil was used in the winter months and cotton seed oil in the summer, because cotton seed oil contains stearines, which separate out on cooling, resulting in the breakdown of the mayonnaise emulsion. More recently, however, what is called "winterised" cotton seed oil has been introduced.

In this case the cotton seed oil is chilled and filtered to remove the stearin bodies. Sesame oil is sometimes used where a pleasant nutty flavour is desired.

You will see, therefore, that it is possible to purchase oil which does not deposit stearines at low temperature, and therefore there is no reason why any trouble should be experienced from this.

Some time ago you asked a question about jelly for canned veal. We do not know if you have settled this matter satisfactorily, but we really do not see that there should be any difficulty at all. Most packing houses prepare a jelly stock separately by boiling suitable waste parts of the meat in pans, which, if the right materials have been used, will readily gel without the addition of gelatin. It is, however, common to add a certain proportion of gelatin, the amount depending on the particular purpose for which the jelly is required.

The meat is brined first and then packed into cans, sealed, holed, heat-exhausted, capped, and then sterilised as for briskets, etc. The meat should be filled tight into the cans; very little jelly should be required.

Rancidity

1,544. *Messrs. X., of Valparaiso, who are subscribers to your journal, write us as follows, and suggest that you might be able to give us the required information:*

"We would be interested in knowing the method of analysis employed in England to determine, in figures, the rancidity and tallowy flavour and odour of milk and milk products, and also whether there are any limits corresponding to good products and doubtful products."

We believe the above enquiry refers particularly to powdered milk, both skimmed and full cream. We would be extremely obliged if you could give us the required information or, failing this, tell us to whom we ought to apply. (London.)

With dried milks the development of "off" flavours during storage is almost invariably due to atmospheric oxidation of the fat—assuming, of course, that the milk has been of reasonable quality, has been efficiently pasteurised prior to drying (otherwise undestroyed lipase may produce a rancid taint by hydrolysis during storage), that the product has not been permitted to absorb foreign odours, and that it has not been stored in bulk under such moist conditions as might permit souring by micro-organisms.

There is no standard method for determining rancidity, etc., and its accompanying changes in dried milk. Dr. C. H. Lea, of the Low Temperature Research Station, Cambridge, who is an authority on this subject, gives the following advice as to the tests which are most suitable for the purpose:

(*a*) For Determination of the Degree of Oxidation: The large amount of protein present will probably prevent anything but a very rough peroxide determination on the material itself. The fat should be extracted rapidly with ether (purified from peroxide by standing over flake caustic soda and distilling). A hot extraction apparatus in which the thimble is completely surrounded by solvent vapour is most suitable. The solvent can then be distilled off from a round-bottomed flask and the fat dried for a few minutes under high vacuum at ordinary temperature. For determination of the degree of oxidation of the fat the peroxide test is probably the most suitable, though Barnicoat (*New Zealand Journal of Science and Technology*, 15, 199, 1933) has recently preferred the Schibstead test (*J. Ind. Eng. Chem. Anal.*, ed., 4, 204, 1932) for estimation of tallowiness in butters.

(*b*) For Determination of Susceptibility to Oxidation: A suitable quantity of the material (*e.g.*, 10 gm.) can be placed in a flask (*e.g.*, a 250-c.c. Erlenmeyer) connected by a capillary tube to a manometric device and heated in a good thermostat at some suitable elevated temperature from 60° to 90° C. The interval before rapid absorption of oxygen commences is a measure of the susceptibility of the fat to oxidation, and thus also to some extent of the initial state of oxidation of the material.

Alternatively, susceptibility can be determined by one of the published techniques in which air and oxygen are bubbled at a constant rate through the fat in a thermostat at 95° C. and rancidity development, followed by peroxide determination (*e.g.*, King, Roschen, and Irwin, *Oil and Soap*, 10, 105, 1933).

Methods of this kind are being used extensively in the United States for oils and fats of all kinds. If, however, these are too complicated for your purpose, it may be possible to obtain a rough idea of keeping quality by placing the material or the extracted fat in a constant temperature oven at 40° to 70° C., and noting the time necessary for first appearance of rancid odour, amount of material and size of dish being, of course, constant.

Methods such as quoted are general for oils and fats.

Actually butter fat is a notoriously difficult case, owing to the low values of the chemical tests at which the flavour becomes objectionable. The numerical values at this point also depend in some degree on conditions of storage —for example, whether in the restricted oxygen supply of a sealed can or in the open. With reasonably similar storage conditions, however, practical experience with the materials and technique employed should calibrate the tests against odour and flavour.

It need hardly be pointed out that the deterioration of fats is a somewhat complicated problem, and that a knowledge of fat chemistry and of rancidity in particular is more or less essential for successful carrying out of work of this nature.

Particulars of the Kreis and Peroxide tests will be found in Dr. C. H. Lea's paper in the *Proceedings of the Royal Society*, B., vol. 108, 1931, p. 175.

Soup

1,545. *Some time ago you favoured us with a recipe for tomato soup suitable for canning, and this has served as a very useful basis to make up a satisfactory line.*

We are now anxious to develop this business, and would like recipes for ox tail, celery, vegetable, and meat, etc., soups, suitable for canning. Could you give us any help in this direction? (Channel Islands.)

A selection of basic recipes was supplied. It should be noted that an article on the manufacture and canning of soups is to be published in an early issue of FOOD MANUFACTURE.

Asparagus

1,546. [*Some further information on the points raised in Enquiry No.* 1,522, *quoted on page* 73 *of the February issue has been supplied by Messrs. Broom and Green, of Covent Garden Market.*]

"We have received several small consignments of asparagus from South Africa this season, which arrived in quite good condition. As the quantities were so small, we understand this asparagus was carried in the steward's vegetable chamber, temperature of which is maintained around 40° F. Export of this product from South Africa is very slight at present, shipments being largely experimental, so special chambers are not yet allocated to it, and little information is available as to the ideal conditions under which it should be carried.

We have, for several seasons past, received quite good supplies of Argentine asparagus, which has reached the market in excellent condition and found quite a good sale. We regret we cannot give you actual quantities shipped, but think you can obtain this information from the Imperial Economic Committee. Argentine asparagus is packed upright in crates, and there is less trouble with the tops of the stems breaking than there is with the South African product."

PATENTS

(Continued from next page)

series of operations comprised in Dr. M. Adler's process (British Patent 402,948) is claimed to be unusually palatable. The original harsh and bitter taste is changed to an almond-like sweetness by subjecting the beans in the first place to a light roasting, followed by peeling and removal of the germ. Bodies imparting an astringent taste are dissolved out with the aid of alcohol or other suitable organic liquid. Not less than ten minutes' heating of the soy mass in aqueous suspension destroys the raw leguminosic taste. This operation is immediately followed by passage of a stream of superheated steam or other indifferent gas heated to the same temperature in order to drive off substances responsible for the characteristic odour of the raw beans. This last operation should not occupy more than thirty minutes at a temperature not exceeding 120° C., so as to avoid decomposition of fats and albuminoids. The final product can be incorporated with other ingredients or diluents and thereby rendered approximately equivalent to cow's milk or human milk. Emphasis is laid upon the value of soy milk as a diet for diabetics.

Stable Chocolate Syrup. As ordinarily prepared by incorporating sugar with an aqueous paste of cocoa powder, chocolate syrups are liable to thicken up and become unpourable after keeping in store for a relatively short time. This troublesome characteristic can be eliminated, according to British Patent 401,333 (Wallerstein Company, Inc.), by preliminary hydrolysis of the starchy ingredients with a diastatic enzyme preparation. Care must be taken to adjust the hydrogen ion concentration of the mixture at a point favourable to the action of the enzyme. The products obtained contain the cocoa fats in an emulsified condition and assist the digestion of milk. It has been demonstrated that the curd of milk to which chocolate syrups of this type have been added is in a much finer and more flocculent condition and more readily dealt with by stomach juices.

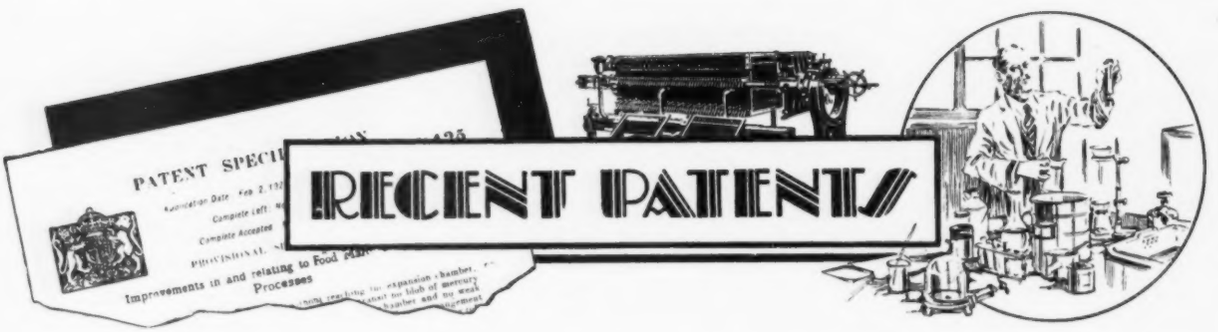
Ready Cooked Breakfast Cereal. Instead of directly treating grains by cooking followed by crushing to yield dry flakes, it is proposed to subject the grain to the following operations in succession: The grain is first softened by some convenient process such as steeping, cooked by heating, converted into pellets or cakes by pressure, flaked by means of the usual squeeze rolls, and, if required, toasted. This procedure is claimed to produce a ready cooked breakfast food from various grains such as oats and rye and enables two or more different grains to be blended. (British Patent 401,555, J. Proctor and Son, H. Higgins, and T. W. Higgins.)

Puffed Cereal Food. On spraying cooked cereal grains with a solution of salt and sugar, there remains, after drying, a coating which permits of internal retention of the steam pressure so as to lead eventually to the formation of a puffed brown product. The grains are cooked in presence of moisture, rolled whilst in the still moist and hot condition, partially dried, and then sprayed with a solution containing, *e.g.*, 2·5 parts salt, 3 to 5 parts sugar, and 20 parts water. The salt-sugar coating formed on the individual grains after drying not only retains the steam at a high temperature until sufficient pressure is induced, but also improves the flavour. When eaten with milk or cream the cold grains retain their crispness. (British Patent 402,188.)

Preservation of Perishable Foodstuffs by Cooling. A cooled circulating current of air in the degerminated and ozonised condition is suggested as a means of preventing mould or fungus growths or putrefaction in fish, fruit, cheese, butter, etc., when stored for prolonged periods. An essential feature of the process is the adjustment of the conditioned air to the humidity necessary to prevent desiccation of the goods.

The suitably humidified air is degerminated by passage through a filter containing an odourless and tasteless sterilising agent, and is then ozonised prior to diffusion into the cooling space, where it forms a current filling up the entire cross-section of the space. By arranging for continuous discharge into the atmosphere of part of the air coming from the cooling space, continual renewal of the internal atmosphere is ensured. Emphasis is laid upon the resulting constancy in the weight of the preserved foodstuffs and the consequent prevention of considerable financial loss.

(British Specification 402,615 of R. Speidel; Application No. 2286 of January 24, 1933.)



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Latest Patent Applications

948. DUTTWEILER, B., and RAW PRODUCTS, LTD.: Pasteurisation of pasty materials.
585. KARPELES, O., and ELACT GES. FUR ELEKTRISCHE APPARATE GES.: Conservation of fats, oils, etc.
696. NAAMLOOZE VENNOOTSCAHP INDUSTRIEELE MAATSCHAPPIJ VOORHEEN NOURY AND VAN DER LANDE: Manufacture of yeast. (Holland, January 11, 1933.)
1099. ESPHOLIN, I. G. S.: Preserving milk products.
1707 and 1708. KARRETH, A.: Enzymes. (Germany, January 26, 1933.)
1040. LABOVITCH, M.: Canning fish.
1716. HENNESÉY, J. DE L., NEILSON, A., and SAHLIN, N. A.: Preserving perishable products.
2362. COVENTRY, R. R.: Juice extractors.
2203. DAY, F. B.: Fruit presses.
1897. HEAP, J. H.: Apparatus for examining eggs.
2445. HOLDER, W. E.: Apparatus for extracting juices from fruits.
2186. SHORT MILLING CO., J. R.: Producing baked products. (United States, January 30, 1933.)
3161. BAUR, J.: Production of food compound for preparing sweetened drinks. (Czecho-Slovakia, January 1, 1933.)
3116. CLAYTON, W., JOHNSON, R. I., and CROSSE AND BLACKWELL, LTD.: Sealing compositions for containers.

Complete Specifications Accepted

403,812. SEARLE, R., and THOMPSON, C. G.: Apparatus for the manufacture, hardening, and storing of ice-cream.
403,868. FRITZ, A. J.: Process for the manufacture of tea free from theine or caffeine.
403,871. KRUPP GRUSONWERK AKT.-GES. F.: Apparatus for drying oleiferous fruits.
404,141. GALBANI, E.: Pasteurised cheese and process for obtaining the same.
404,191. FOOD MACHINERY (M. AND P.), LTD.: Cooking and cooling of canned goods.
404,228. GILBERT, P.: Treatment of coffee for the purpose of expelling the caffeine.
404,407. BARRY, E. A., and MANBRE AND GARTON, LTD.: Packing of invert sugar and like sugars.
404,459. BRAASCH, H., and BRAASCH, DR. A.: Production of yeast.
404,539. REICHSVERBAND DES DEUTSCHEN GARTENBAUES, E. V.: Process for protecting vegetable and animal goods during storage.
404,547. FAUTH GES., P. L.: Distillation of miscella and the deodorisation of the oils and fats contained therein.
404,729. MURRAY, H. L.: Method of and apparatus for deodorising liquid cream or milk.
404,769. STEAD, J. C., and PEARS, H. W. K.: Extraction of sugar from sugar beet or other sugar-containing material.
404,850. RAW PRODUCTS, LTD., and DUTTWEILER, B.: Means for pasteurising materials of a pasty consistency.
404,677. TRES CREMISCH-PHARMAZEUTISCHE INDUSTRIE UND HANDELS AKT.-GES.: Process for the manufacture of diabetic foods rich in albumen.
404,871. LINLEY, J. A.: Process of preserving meat.
405,116. BEHREND, B.: Manufacture of margarine.
405,192. KRONBERG, N. M.: Manufacture of milk powder.
405,228. REICHE AKT.-GES. A., and REICHE, A.: Moulds for bonbons and the like.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Published Abstracts

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

Sugar Juice Purification. Applications of base exchange substances to the purification of sugar juices are described in British Patent 402,953, of Austerweil and Jeanprost (purification and/or sterilisation of liquids by means of base exchangers). One of the advantages is the high yield of sugar, since the salts (mainly soluble potassium phosphates) and nitrogenous matter in the juices which are removed by the base exchange process of the invention largely determine the molasses content. The process is operated with the aid of appropriate mixtures of potassium-calcium or potassium-barium base exchangers or potassium and aluminium base exchangers. Alkaline cations are taken up by these base exchangers when the anions are precipitated in the form of calcium or aluminium phosphates and calcium or aluminium salts of certain organic acids. In addition, part of the nitrogenous matter, albuminoids, and colouring matter is precipitated in the form of an aluminium or barium lake, which can be filtered off from the clarified juice. The invention can also be applied, it is stated, to diffusion sugar juice which has been chalked in the usual way to precipitate phosphates and albuminoids, and from which the chalk has been precipitated in the customary manner by saturating the juice with carbon dioxide. (German convention date, January 20, 1932.)

Caffeine-Free Tea. An extraction process is outlined in British Patent 403,868 of A. J. Fritz, the fermented or unfermented tea leaves being broken up with organic or inorganic solution of alkalis prior to extraction of the caffeine with a suitable solvent, and the aromatic ingredients in the extracted substance are separated from the caffeine and returned to the leaves. An example specifies agitation for twelve hours of 100 gm. dried tea leaves, 66 c.c. aqueous alkaline solution, and 500 c.c. caffeine solvent. The leaves are then isolated and dried. The extracting medium is distilled off, the residue redissolved in ether or other suitable organic solvent and washed with water acidulated with hydrochloric acid. This solution is incorporated with the tea leaves whilst the solvent is being evaporated.

Soy Milk. The unfamiliar taste of the vegetable milk directly extracted from the soy bean is distasteful to Europeans, and previous attempts to refine the liquid in such a manner as to overcome this defect have not been markedly successful. The milk obtained by the

(*Continued on previous page.*)